

УДК 796/799: 614.1

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PHYSICAL EDUCATION AND SPORT AS A PROMOTION TO A HEALTHY LIFESTYLE MONITORING OF STUDENTS' PHYSICAL EFFICIENCY (BEEP-TEST)

The aim of the study was to establish the state of physical efficiency of students as a part of health promoting. The standardized 20-m shuttle run test was used to determine the conditions of the students' cardio-respiratory system and its changes. The study was carried out among 415 non-athlete Bulgarian students (233 women and 192 men from UFT-Plovdiv, Bulgaria) with 758 observations and the results were compared with the results of 4355 Polish, Slovakian and Romanian students. In 2004, Bulgaria was stated as the country with the lowest level of physical efficiency and the highest burden of cardiovascular diseases (CVD). On the basis of the good practices and the achievements of the Polish and Slovak scientists and pedagogues [9], a national Bulgarian strategy to reduce the increasing hypodynamia has to be worked out, and it is also desirable that team resources of all state authorities be combined for achieving the health promotion. It is of great importance that more attention be paid on the physical prophylactic of each age group of the population so that a National program for prevention of chronic, non-communicable diseases (2013-2020) be worked out by the Ministry of Health Protection, the World Health Organization, the Ministry of Education, Youth and Science, and the Ministry of Physical Education and Sport in order to achieve an increasing quality of life and health prevention.

Keywords: health promotion, cardiorespiratory fitness, physical education.

Целью исследования было установить состояние физической работоспособности студентов в рамках укрепления здоровья. Стандартизированный 20 - м Тест челночный бег был использован для определения условия кардиореспираторной системы у студентов и его изменений. Исследование проводилось среди 415 не-спортсменов болгарских студентов (233 женщин и 192 мужчин из UFT - Пловдив, Болгария) с 758 наблюдений и результатов сравнивались с результатами 4355 польском, словацком и румынских студентов. В 2004 году Болгария была сформулирована страны с самым низким уровнем физической работоспособности и наибольшим бременем сердечно-сосудистых заболеваний (ССЗ). На основе передового опыта и достижений ученых и педагогов Польши и Словакии [9], национальный болгарский стратегия сокращения растущего гиподинамии должен быть разработан, и это также желательно, чтобы команда ресурсы всех государственных органов будет объединены для достижения укрепления здоровья. Это имеет большое значение, что больше внимания на физическом профилактики от каждой возрастной группы населения, так что Национальная программа профилактики хронических, неинфекционных заболеваний (2013-2020) быть разработаны Министерством охраны здоровья, Всемирная организация здравоохранения, Министерство образования, молодежи и науки, и Министерство по физической культуре и спорту в целях достижения все большее качество жизни и профилактики здоровья.

Ключевые слова: пропаганда здорового образа жизни, кардиореспираторная подготовка, физкультура.

The necessity to implement preventive actions is a result of the fact that cardiovascular diseases are still the main cause of death [5]. It should be noted that in 2004, Bulgaria was the country with the highest level of deaths caused by blood vascular diseases in the European Union [1]. The risk of Bulgarians dying from CVD is similar to that of the corresponding Eur-B+C

average; however, it is about three times higher than corresponding Eur-A average [8, 11]. According to the DALYs, high blood pressure and tobacco place the greatest burden of diseases on the Bulgarian males and respectively high blood pressure and high level of body mass index (BMI) on females. The lack of physical activity has rate 7 for males and 4 for females of the first ten burdens of diseases. Cardiovascular diseases (CVD) and neuropsychiatric condition account for the highest burden of disease, both among males and females in Bulgaria [8, 11].

There is subordination between the rating of cardiovascular diseases, the studied nationality [10, 11] and the problem of physical efficiency (Table 1).

Table 1
Environmental burden by cardiovascular disease [DALYs/1000 capita], per year

Country	World's lowest country rate	Country rate	World's highest country rate
Poland	1.4	5.4	14
Slovakia		2.4	
Romania		8.3	
Bulgaria		11	

Sources: [10]

It has to be emphasized that the registered results about the condition of the cardiovascular system, as an indirect measurement of cardiovascular fitness through the 20-m shuttle running test, are substantiated by World Health Organization data and reports.

In relation to this, the *Keep Fit* program, coordinated by the Chief Sanitary Inspectorate was established in Poland. The program is focused on children and young adults as well as their parents [7]. Presently, a project named *Activity for the Whole Life – Polish – Slovakian Physical Education and Students' Health Promotion Platform* is being carried out. The project is about to identify and modify (educational action) selected risk factors of ischemic heart disease, such as low level of physical activity and cardio-respiratory resistance, irrational nourishing, overweight, abdominal obesity, tobacco smoking as well as activities related to health education. The Health Platform is elaborating to be a helpful tool in shaping health efficiency of youth, and particularly the morphologic and cardio-respiratory [9] efficiency so as to be connected to the high quality of life [6, 7].

The period of university study is the last stage in which cardiovascular disease prevention can be carried out through health education focused on development,

maintenance and physical monitoring [3, 6]. Unfortunately, there is no uniform system of measures for evaluating the physical fitness of the students in the Republic of Bulgaria. Following their rights of autonomy, higher schools (HS) decide on how they interpret legal regulations, as they autonomously determine the need of a control and assessment system. It has been proved that the efficacy of the teacher's educational work is directly dependent on the control, check-up and assessment of the results of his/her work. A preliminary analysis of the psycho-physical condition of trainees ensures that the educational process in Physical education is built-up in conformity with the didactical principles, and applying the appropriate physiological load, functional and structural refinement in line with the students' capacity is to be achieved. At the same time monitoring of physical condition would be part of health promotion of cardiovascular diseases.

The aim of the study was to establish the state of physical efficiency of the Bulgarian students as part of health promoting.

To achieve this objective, we had to fulfill some of the following basic tasks:

- Assessment and analysis to register results of the cardio-respiratory fitness of Bulgarian students.
- Compare the data gathered from the Bulgarian students with similar results taken from students from the former eastern block - Poland, Slovakia, Romania.

The methodology of the study included:

1. Analysis of the literature on the subject.
2. The method of determining the state of the cardio-respiratory system of the students that was used was: standard beep-test (Beep test), created by Dr. Maximillion Ledgear in 1982, published in the European Journal of Applied Physiology and successfully applied in a number of international studies on the aerobic capacity (aerobic fitness) of different age groups [4- 6]. The test was carried out in a gymnasium (with a 5-min warm-up) and it was a controlled run of the distance of 20-m shuttle back and forth, with an increasing tempo given by a time signal, until the refusal (fatigue) of the tested person, or the decrease of run's tempo not accordingly to time signal [6, 7, 10-15].

3. The study of the physical performance (physical efficiency) of students was conducted at the University of Food Technology and the Agricultural University in Plovdiv in the period between 2008 and 2012. A total of 415 students were examined, 233 female students and 192 male students with a total of 758 observations.

4. Statistical processing of the obtained data (by sex designation). Arithmetic mean of the absolute value VO_2 max and the running distance for studied group. The analysis with program product of Microsoft Excel.

Table 2
Distribution of the number of students (women and men) in accordance to their nationality

Gender	Nationality				Total
	Poland	Slovakia	Romania	Bulgaria	
Women	1965 (58,6%)	397 (61,2%)	204 (57,8%)	233 (56,1%)	2799
Men	1388 (41,4%)	252 (38,8%)	149 (42,2%)	182 (43,9%)	1971
Total	3353	649	353	415	4770

The total number of students tested through the Beep-test is 4770 from Poland, Slovakia, Romania and Bulgaria, where the dominant students are female in all the countries. Tables 2 and 3 show the distribution of the number of students in accordance to their nationality and the specification of their faculties, respectively. In the analysis of the results it is necessary to be marked that almost 1/3 (27%) of the tested Polish students were with professional qualification PE, which means that they have been or still were active athletes and they were in general in a higher level of condition (Table 3).

Table 3
Distribution of the number of students in accordance to the specification of the structure of faculties

Faculty	Nationality				Total
	Poland	Slovakia	Romania	Bulgaria	
Physical education	906 (27%)	28 (4,3%)	60 (17,6%)		994
Others	2447 (73%)	621 (95,7%)	280 (82,4%)	415 (100%)	3763
Total	3353	649	340	415	4757

Level of cardio-respiratory fitness comparison observing nationality.

On the basis of the gathered results of male and female students, with the help of descriptive statistics (table 4) we can see that there is a high diversion of SD – 229 for women and 408.4 for men. The score of the average running distance for each gender certainly shows the lowest level of physical efficiency of the students which means a very poor condition of cardio-respiratory fitness. The average of running level for female 2.94 (377.5 m.) and 5.03 (784.1 m.) for male indicate that there is the very poor level of physical conditions for both sexes, in accordance with the established norms (very poor results <4 for female, <5 for male) [3].

Descriptive statistics of the results of bulgarian students

Index	FEMALE				MALE			
	Level	Shuttle	Distance	VO2 max	Level	Shuttle	Distance	VO2 max
Mean	2.94	3.99	377.5	23.97	5.11	5.03	784.1	31.78
Standard Error	0.09	0.16	15	0.297	0.162	0.21	30.28	0.555
Standard Deviation	1.3	2.4	229	4.531	2.182	2.89	408.4	7.493
Minimum	1	1	60	17.06	1	1	120	18.45
Maximum	7	9	1160	38.83	10	11	1820	49.24
Count	233	233	233	233	182	182	182	182
Confidence Level (95.0 %)	0.17	0.31	29.55	0.585	0.319	0.42	59.74	1.096

Table 4

A detailed analysis of the data is available in previous related publications [5-7] so at present we focus on the main significant data. First of all, we were far from glad to observe the bad results of the Bulgarian

students, which show 90.1 % very poor or poor cardio-respiratory fitness for women and accordingly 86.8 % for men (Table 5).

Table 5

Specification of the level of cardio-respiratory fitness of the students in accordance to their nationality

Cardio-respiratory fitness		Nationality							
		Poland		Slovakia		Romania		Bulgaria	
		female	male	female	male	female	male	female	male
		n-1965	n-1388	n-397	n-252	n-204	n-149	n-233	n-182
Very poor	n	14	25	3	5	1	3	192	145
	%	0,7%	1,8%	0,8%	2%	0,5%	2%	82,4%	79,7%
Poor	n	220	28	49	6	61	6	18	13
	%	11,2%	2%	12,3%	2,4%	29,9%	4%	7,7%	7,1%
Fair	n	526	194	127	39	74	37	14	24
	%	26,8%	14%	32%	15,5%	36,3%	24,8%	6%	13,2%
Good	n	507	250	91	52	40	33	9	
	%	25,8%	18%	22,9%	20,6%	19,6%	22,1%	3,9%	
Excellent	n	421	449	83	84	10	35		
	%	21,4%	32,3%	20,9%	33,3%	4,9%	23,5%		
Superior	n	277	442	44	66	18	35		
	%	14,1%	31,8%	11,1%	26,2%	8,8%	23,5%		

As it can be seen from Figures 1 and 2 Bulgarian students not only demonstrated the weakest performance compared to students from other countries studied, but they also showed an extremely low level of adaptation of the cardio-respiratory system. Average values (fair) of the condition status of the Bulgarian students were identified only in 6 % of the observations in women and 13.2 % of the observations in men. The fact that the good results were recorded only with

female students and they were only 3.9 % of the examined, and there was not a single excellent or superior result in both sexes was disturbing. Overall, 90.1 % of the women and 86.8 % of the Bulgarian male students did not reach the average endurance state and fair physical fitness.

It is necessary to emphasize the high level of physical fitness of students from Poland, Slovakia and Romania, which have shown similar results with above the average level respectively 82.1 %, 80.1 % and 69.1 % in men and 61.3 %, 54.9 % and 33.3 % in women. Although closely behind, most observations on the levels of excellent and superior are observed for Polish students, which may be due to the largest number of respondents with a major in physical education.

The highest percentages of average values for women of all respondents were observed in the results of the Romanian students, respectively 24.8 % for men and 36.3 % for women.

There are excellent and superior results in the observed countries, except Bulgaria, for both genders. We can also say that there is a similar physical efficiency between the tested students from Poland and Slovakia. Romanian students have stable data of cardiovascular capacity with the similar result for good, excellent and superior rate for both female and male

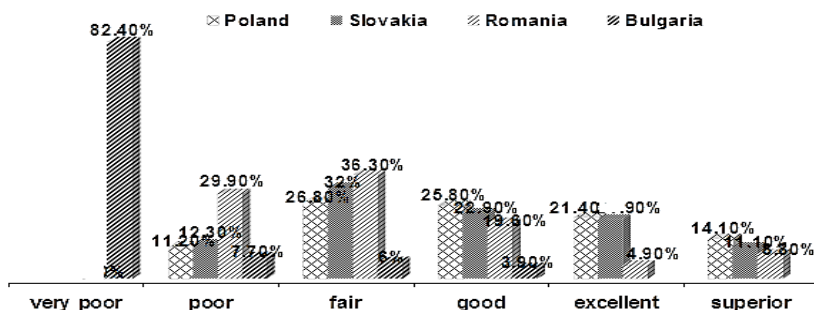


Fig 1. Specification of the level of cardio-respiratory fitness of students - female in accordance to nationality

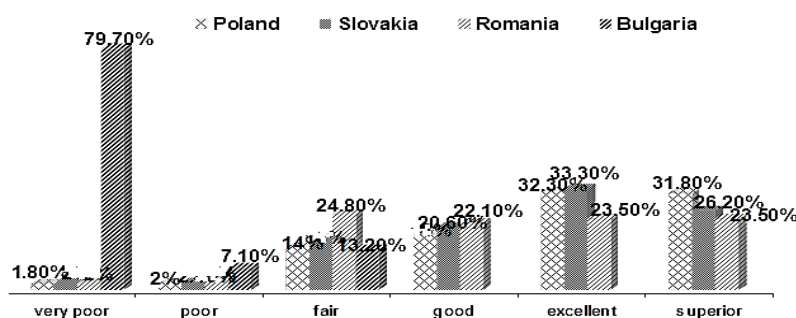


Fig 2. Specification of the level of cardio-respiratory fitness of students - male in accordance to nationality

students. Unlike other nations, where over 90 % of the subjects showed a level of cardio-respiratory system of above-average to excellent values, over 80 % of male and 90 % of female Bulgarian students displayed very poor indicators of physical endurance, and respectively the systems responsible for implementing the test, namely cardiovascular and respiratory.

Unfortunately, these data are positively correlate to the health status of the Bulgarians with one of the highest ratings for cardiovascular diseases – country rate for Bulgaria is 11 (**World's highest country rate** is 14) [10,11]. Bulgaria is the country with the lowest level of physical efficiency and the highest burden of cardiovascular diseases. But in accordance with the overall assessment and the fact that almost one third of Polish students are active athletes, we can claim that the Slovak had the highest level of physical fitness as general and the lowest burden of CVD -country rate for Slovakia was 2.4.

DISCUSSION AND CONCLUSION

All this groping about in the dark of the governmental policy during the socio-economic crisis of post-communism in Bulgaria on health and education of people results undoubtedly both in low quality of education and restriction of the capacity to carry out the social, healthcare and educational functions of the school subject Physical Education and Sports. Unfortunately, these trends are seen in practice where during sports lessons first-year students show a lack of the

necessary level of physical capacity, motor culture, skills and available knowledge for adequate performance of training in Physical Education and Sports. We consider it advisable that evaluating the physical endurance through the 20-m shuttle run test becomes a constant input in high school. This would stimulate the purposive work for the development of cardio-respiratory system, and at the same time, Physical Education would fulfill one of its main objectives, namely, health prevention of high-school students and prophylaxis of the cardiovascular diseases at young age. The choice of healthy lifestyle (including optimal physical activity) is a result of personal motivation, but appropriate information supporting undertaking this decision is a responsibility of health, social and state authorities. On the basis of the good practices and achievements of the Polish scientists and pedagogues www.studentfit.eu, a national Bulgarian strategy to reduce the increasing hypodynamia has to be worked out, and it is also desirable that team resources of all state authorities are combined for achieving the health promotion mentioned above. The effect of our sports-and-pedagogic work has to be improved by means of adequate content in accordance with the efficiency, motor and theoretical experience of students referring to their physical culture and healthy lifestyle since the health condition is a key factor in achieving happiness and high-quality life.

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Отримано редакцією 11.2013 р.

УДК 664.8.022.33:635.4

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Одеська національна академія харових технологій

ДОСЛІДЖЕННЯ СТАБІЛІЗАЦІЇ ПІГМЕНТНОГО КОМПЛЕКСУ ЛИСТОВИХ ОВОЧІВ

В статті розглянуті фактори, що впливають на феофітінізацію пігментного комплексу зелених листових овочів. Встановлені параметри, що запобігають видозмінам хлорофілу та забезпечують його максимальне збереження в готовому продукті.

Ключові слова: хлорофіл, пігментний комплекс, біологічно активні речовини, антиоксиданти, листові овочі.

The article deals with the factors affecting pheophytinisation of green leafy vegetables pigment complex. Parameters that prevent