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Analiza i porównanie wyników testu Pilicza jako próba oceny sprawności fizycznej

The analysis and comparison of Pilicz's test results as an evaluation of the physical fitness

Streszczenie

Wstęp. Negatywnym skutkiem zmian cywilizacyjnych jest ograniczenie aktywności fizycznej i wzrost zjawiska hipokinezji.

Cel. Celem pracy jest analiza i porównanie wyników zmodyfikowanego testu Pilicza uzyskanych przez studentki I i II roku farmacji w latach 1990/1992, 1999/2001 i 2007/2008 oraz ukazanie kierunku tendencji zmian sprawności fizycznej tej grupy młodzieży.

Materiał i metoda. Badaniem objęto 90 studentek farmacji Akademii Medycznej w Lublinie, u których oceniano zdolności motoryczne na podstawie testu Pilicza i próby wytrzymałości zaczerpniętej z baterii testów Denisiuka.

Wyniki. Biorąc pod uwagę oceny z przedziału od 4 do 5, to w latach 1990/1992 stanowiły one 70% wszystkich ocen, 55% w latach 1999/01 i tylko 37% w roku 2007/2008. Grupa studentek z rocznika 1990/1992 osiągając średnią oceny 4,0 plasuje się na pierwszym miejscu. Studentki z rocznika 1999/2001 osiągnęły średnią ocenę równą 3,75 zajmując jednocześnie drugie miejsce. Najgorszą ocenę 3,5 uzyskały studentki z grupy 2007/2008.

Dyskusja. Wykazana tendencja spadkowa kondycji fizycznej studentek farmacji Akademii Medycznej w Lublinie może być spowodowana znacznym rozwojem cywilizacyjnym (komunikacja, boom motoryzacyjny), życiem w ciągłym pośpiechu, stresie, złą dietą (fast foody) oraz zbyt niską aktywnością fizyczną.

Wnioski. Analiza wyników wykazała tendencję spadkową zdolności motorycznych pomiędzy badanymi grupami, natomiast w obrębie każdej z nich zauważono poprawę ogólnej sprawności spowodowaną pozytywnym wpływem wychowania fizycznego.

Słowa kluczowe: zdolności motoryczne, test Pilicza, fizjoterapia.

Abstract

Introduction. A negative effect of civilization changes is lowering of the level of individual physical fitness and more and more frequent phenomenon of hypokinesis.

Aim. The aim of the study is to compare the results of the tests conducted in the group of the 1st and 2nd year pharmacy students in 1990/92, 1999/01 and 2007/08. Additionally, the study attempts at anticipating the direction of students' physical development changes.

Materials and methods. The research was conducted in a group of 90 female pharmacy students of the Medical University of Lublin. The study focused on testing motor skills with the use of motor skills test by Stefan Pilicz which was supplemented with the stamina test by Denisiuk.

Results. Grades ranging from 4(B) to 5(A) constituted 70% of all the grades in 1990/1992; in 1999/01 they constituted 51%, and in 2007/08 – only 37%. The best results were achieved by the 1990/92 test group with the average grade of 4.0; the 1999/01 group obtained the average grade of 3.75; the 2007/2008 – test group was classified as the weakest with the average result of 3.5.

Discussion. The observed decline in the level of physical fitness of the female pharmacy students at the Medical University of Lublin may be caused by the immense civilization development (communication, automotive boom), life in constant haste and stress, poor diet (fast food) and a low level of students' physical activity.

Conclusion. Even though the general level of the students' motor skill is in decline, physical fitness of the students improves as a result of their participation in physical education classes.

Key words: motor skills, physical fitness test by Pilicz, physiotherapy.

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INTRODUCTION

Fast and incessant civilization and technical changes are aimed to improve human environment. Those 'improvements' result in continuously increasing restrictions to natural physical activity, which leads to hypo-kinesis, a chronic movement deficiency. A growing interest in hypokinesis and its negative effects is reflected in the number of studies focusing on physical fitness and human motricity. The health-related aspect of physical fitness is particularly popular as it is of great importance not only from the vantage point of an individual, but also of the general biological, social and cultural development [1]. A high level of physical fitness is claimed to result in much greater tolerance to effort, a better adjustment to environment and a more efficient performance of everyday duties.

Young people entering a university constitute a very diversified group with respect to their level of physical development. Tests concerning the level of physical fitness constitute an important source of information about its current state and structure. They also show negligence or progress in the process of physical fitness development [2].

Our interest in the topic stems from the urge to determine the current level of physical fitness of the female pharmacy students. Additionally, our aim is to anticipate the trends in its development.

Theoretical background

From bio-mechanistic point of view, physical fitness is understood as "an efficiency of biological action of an organism", or, in other words, the relationship between movement efficiency and the morphological background (individual predispositions) [3].

According to the behavioral-cultural concept, physical fitness is defined as the ability to conduct everyday duties without experiencing an excessive tiredness and to preserve large amounts of energy to spend free time in a pleasant way [3].

The measure of physical fitness is the interplay of such qualities as strength, speed, stamina or coordination [4]. On the basis of these assumptions Denisiuk (1967) and Chromiński (1981) tests were developed.

Changes in the attitude towards the physical activity are caused by the evolution of the concept of it. According to the 'health-related fitness' approach, its aim is to achieve physical health, which in turn is to guarantee health in general [3].

Having taken all approaches into account, we can stipulate that physical activity is a distinctive feature of human beings which comprises a specific level of motor skills and movement abilities that make it possible for an individual to perform varied physical actions. It ensures efficiency and effectiveness of movements in everyday life.

The level of one's motor skills is called motricity [5]. The concept of motricity was introduced by Denisiuk in the 1960s and is understood as a skill that requires no application of sports techniques during the test assessment. There is a direct relation between an individual's age and the level of their motricity. With the growth and biological development of the system we observe a gradual improvement of bodily functions. The versatile character of motricity is a consequence of the development of all motor skills. Particular motor skills can either remain in a mutual relationship in particular areas of physical activity or show no correlation at all. This, in turn, makes it possible to construct batteries of tests putting into scrutiny specific groups of physical activities.

Motor skills, which are determined by mutually related environmental and genetic factors, are complexes of predispositions linked together by a common motor and biological background. Motor skills create human mobility in general at the same time determining the system's readiness for an efficient performance of physical activities [6]. There are particular types of motor skills that are characterized by a specific, dominant factor connected either with predispositions or a type of movement. We distinguish 3 basic groups of skills: fitness (energetic), coordinating (informative), hybrid (comprehensive).

The development of physical fitness and motricity is connected with such factors as genetics, environment or culture. As a result of interaction, skills reach its fullest development in the period of adolescence [3]. It is a consequence of an intensive bodily growth, muscle development, hormonal changes in the organism, and balancing the stimulation and inhibition processes. By the end of this period the female and male motor actions are fully developed.

The means of physical fitness measurement and evaluation have caused a number of debates, which is reflected by a vast bibliography and a large number of tests related to the issue. Since the 1920s we have observed a dynamic growth in the number of studies on the topic of physical fitness. The Polish pioneer in methodology of human motricity was Prof. Jan Mydlarski, who also created his own scale of fitness measurement. He proved that there is a significant relationship between body building and fitness. Mydlarski pointed out that the results achieved in tests together with general physical development indexes (height, weight, age, sex) constitute the data that allow evaluating the level of physical fitness of an individual [7]. The data collected in Mydlarski's tables allow comparing the achieved results and showing the tendency in the development of the investigated individuals. After World War II R. Trześniowski continued the work of Prof. Mydlarski and modified his measurement system by increasing the number of trials, introducing new age groups and significantly changing the grading scale. Apart from the tests mentioned, Denisiuk's test, Pilicz's test, Eurofit-European fitness test, YMCA test and others are also used in the general fitness assessment [8]. The test results are aimed at motivating people to improve their fitness and at increasing awareness of the issue.

Although a great number of tests have been conducted, there are still certain problematic issues concerning motricity and fitness in young people. One of them is how to define the tendencies in the fitness changes between generations and how to discover the underlying causes. A gradual decline in the physical activity of young people is believed to result from a sedentary lifestyle, poor eating habits and stress. In consequence, the level of fitness of female pharmacy students attending physical education classes in 2007/2008 has decreased when compared with the previous year. The level of their motor skills, however, is believed

to increase by the end of the 2nd year of studies due to participation in PE classes. Additionally, it was assumed that students with a proper Body Mass Index would show a higher level of physical fitness.

AIM

The aim of the study is to compare the results of the tests conducted on a group of the 1st and 2nd year pharmacy students in 1990/92, 1999/01 and 2007/08 academic years. Additionally, the study attempts to anticipate the direction of students' physical development.

MATERIAL AND METHODS

The research was conducted in a group of 90 female pharmacy students of the Medical University of Lublin. The authors used the results of the research conducted in 1990/92 (30 female students) and 1999/01 (30 female students) by the employees of the Faculty of Sport and Physical Education at the same university. The group of 30 students was surveyed on 9th November 2007 at MU gym. Beforehand, a pilot test was conducted in order to eliminate any factors (focus on proper warm up, shoes dampening to improve their adhesion to the surface) that could negatively affect the test results.

The basic research tool was Stefan Pilicz's motor skills test conducted at the beginning of the 1st and at the end of 2nd year of studies at the Medical University of Lublin, the 2nd year being, at the time, the last year of obligatory PE classes. The research tested four motor skills: agility, power, strength and stamina.

The test included: 3m×5m timed run as an agility test, long jump as a power test, two-handed throw of a 2-kg medical ball from over one's head as strength test, and as a stamina test – an exercise that included: a sequence of knee bends, 2-legged thrusts to the back, accompanied with claps over one's head. The power and strength test were repeated 3 times and the best results were taken into consideration. The agility and stamina tests were conducted only once, as they required a lot of effort. The greatest advantage of Pilicz's test is its easiness and the fact that it is time-efficient. Its weak point is lack of trials assessing stamina and coordination skills [9].

For this reason Ludwik Denisiuk's stamina test No. 4 was incorporated into the study. The test consists in making a knee bend from the standing position, 2-legged throw to the back, return to a knee-bend position and then to the standing position, accompanied with a clap over one's head. The test is assessed on the basis of the number of completed cycles (30 sec. for women, 1 min for men).

Both 1990/92 and 1999/01 tests were conducted in standardized conditions at the beginning and the end of the course of physical education at university. As a result of the reduction of the number of PE classes, the students of 2007/08 were scrutinized only at the beginning of the 1st year of studies.

The achieved results were supplemented with the data concerning weight and height of the surveyed students. The data were used to define individual body mass indexes. BMI is a quotient of a body mass [kg] and squared height [m], and was used to evaluate the somatic development of the students. The students were examined without shoes and in light clothes [10].

Body mass index scale – individuals aged 16 and more:

- < 15 - extreme emaciation
- 15.1 < 17.4 - emaciation
- 17.5 < 18.5 - underweight
- 18.5 < 24.9 - proper weight
- 25.9 < 29.9 - overweight
- 30.0 < 34.9 - level 1 obesity
- 35.0 < 39.9 - level 2 obesity
- <=40.0 - level 3 obesity (pathological)

The results were collected and analyzed with the use of the appropriate statistical functions of Excel.

RESULT

According to the results presented in Table 1, the best average of the timed run was achieved in 1991/92 and 2000/01 (the end of the PE course in both cases). The best average was 53.33 points, which is an equivalent of 28.3 seconds. The worst result of 29.8 seconds was achieved in 2007/08. In the case of power tests, the best result of 175 cm appeared in 1991/92 and 2000/01. The shortest average jump of 167 cm was made in 1990/91. The longest average throw of a medicine ball was that of 630 cm and was performed in 2007/08; the shortest one was 580 cm and was made in 1999/00. The best stamina test results appeared in 2007/08 (15 cycles) and the poorest ones in 1999/00 (12 cycles). All in all, the power and stamina tests yielded the best results out of all skills tested.

Scores ranging from 4(B) to 5(A) constituted 70% of all the scores in 1990/92; in 1999/01 they reached 51%, and in 2007/08 – only 37% (Fig.1).

The average grade of 4 was achieved by the 1990/92-test group; the 1999/01 group scored the average of 3.77. The C grade given to the 2007/08 students is an indicator of the decline in the level of students' physical fitness (Fig.2).

TABLE 1. The analysis of particular motor skills.

Academic year	Agility test		Power test		Strength test		Stamina test	
	min-max	arithm. mean	min-max	arithm. mean	min-max	arithm. mean	min-max	arithm. mean
1990/1991	29 – 66	49.6	2 – 73	49.7	35 – 78	53.37	42 – 71	56.83
1991/1992	31 – 69	53.33	23 – 76	54	41 – 79	49.87	42 – 76	53.73
1999/2000	20 – 63	47.55	26 – 76	50.7	31 – 73	49.07	38 – 62	49.4
2000/2001	31 – 67	53.33	34 – 74	54	35 – 78	49.87	38 – 66	53.73
2007/2008	20 – 63	46.1	23 – 76	53.2	41 – 79	54.3	42 - 76	59.67

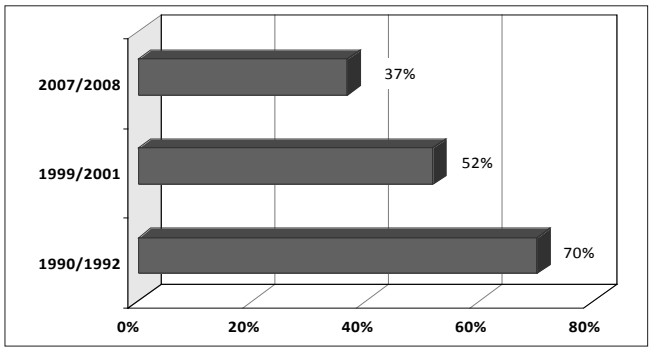

FIGURE 1. Grades of 4(B) and 5(A) for the examined groups.

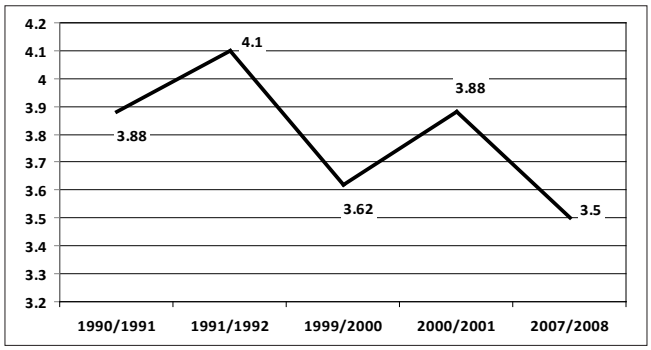

FIGURE 2. The average grades of Pilicz's test achieved by the examined groups.

TABLE 2. Standards of physical fitness (female students) .

	Grade	Ranges of grades in points (total)
High	Very good (A)	254 and more
	Good + (B+)	253 – 230
Medium	Good (B)	229 – 200
	Satisfactory + (C+)	199 – 177
Low	Satisfactory (C)	176 – 152
	Unsatisfactory (D)	151 and less

TABLE 3. The comparison of average grades of all tests and the assessment of the physical fitness level.

Academic year	The minimum number of scores from tests	The maximum number of scores from tests	The medium number of scores from the whole test	The level of physical fitness/ grade
1990/1991	154	268	209.5	Average / 4.0
1991/1992	163	277	222.78	Average / 4.0
1999/2000	128	254	196.72	Average / 3.5
2000/2001	151	263,5	210.93	Average / 4.0
2007/2008	121	240	189.13	Average / 3.5

Still, there is a difference in the average grade received by particular test groups (1990/92 and 1999/01). The research shows that in comparison with the results achieved at the beginning of the study, students taking part in the obligatory PE classes achieved higher results. This, in turn, indicates a growth in the level of students' physical fitness (Fig.2).

Analysing Table 2 and Table 3, we can assess the general level of physical fitness of the tested groups as average. The 1st place was achieved by the 1990/92-test group with the average grade – 4.0; the 1999/01 group obtained the average grade of 3.75; the 2007/08-test group classified as the last with the result of 3.5.

Figure 3 presents the tendency in the development of physical fitness of the tested groups.

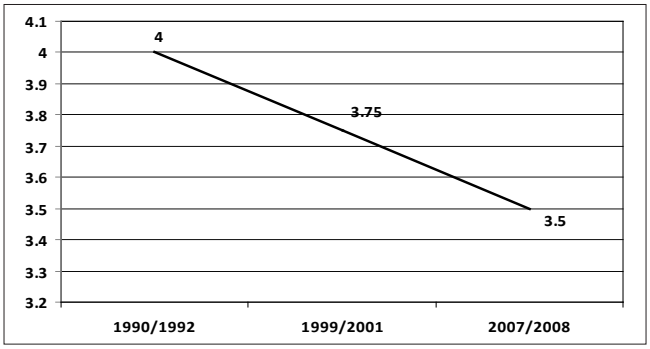

FIGURE 3. The line representing the tendency in the physical fitness development of students.

Analysing the body mass index of the students, we can observe the absence of individuals suffering from overweight or obesity. Yet, there is a difference in the number of students suffering from emaciation or underweight. In 1999/01 there were 2 students (7% of the population) with BMI below 17.4; 5 students were classified as suffering from underweight constituted 17% of the whole group; 94% of the 1990/92-test group was categorized as having a proper BMI. On average, 97% of all surveyed students represent a proper BMI (Table 4).

TABLE 4. Body mass index.

Group / BMI	Emaciation	Underweight	Proper weight	Overweight	Obesity
1990/1992	3%	3%	94%	0%	0%
1999/2001	7%	17%	76%	0%	0%
2007/2008	0%	3%	97%	0%	0%

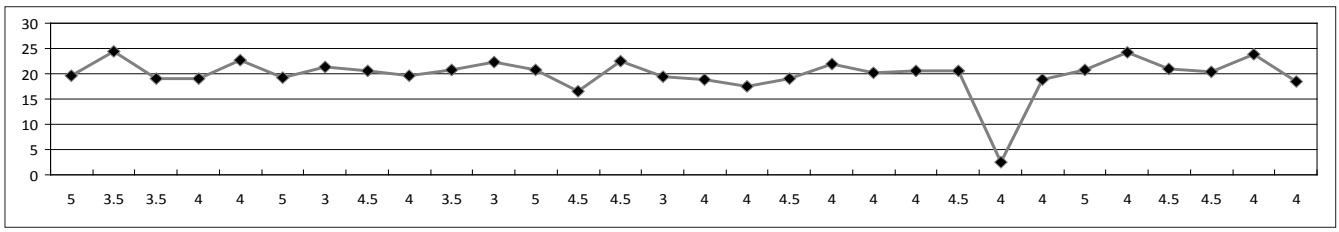

FIGURE 4. Pearson's correlation index for the year 1990/1992.

The analysis of the test results leads to the question whether we can assume that the level of one's physical fitness depends on such somatic features as weight or height. Taking into account Pearson correlation index, which includes the level of individual physical fitness and particular BMI: R=-0.1 for 1990/92, R=0.1 for 1999/01 and R=0.005 for 2007/08, we can state that there is a very weak link between a proper Body Mass Index and a higher level of physical fitness (Fig.4). One's physical fitness depends on many other, complex factors, but has little to do with Body Mass Index.

DISCUSSION

The observed decline in the level of physical fitness of the female pharmacy students at the Medical University of Lublin may be caused by the immense civilization development (communication, automotive boom), life in haste and stress, poor diet (fast food) and a low level of students' physical activity.

CONCLUSIONS

1. Taking into account Pilicz's classification, the level of physical fitness in the tested groups is believed to be average. 1990/92-test group achieved better results than the subsequent groups.
2. The general physical fitness of the students improved as a result of their participation in physical education classes.
3. The level of students' physical fitness is in decline.
4. The power and stamina tests showed the highest results.
5. According to Pearson's correlation index, the correlation between a proper BMI and the level of physical fitness is very low. In other words, BMI has no influence on the level of one's physical fitness.

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