

Test Fullerton w ocenie sprawności fizycznej chorych na POChP

Fullerton test in the assessment of patients with COPD

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Streszczenie:

Celem badania była ocena sprawności z wykorzystaniem Testu Fullerton u chorych na POChP po 60 roku życia. Grupę badaną stanowiło 53 chorych na POChP, w grupie kontrolnej zbadano 34 zdrowe osoby, słuchaczy Uniwersytetu Trzeciego Wieku. Do oceny sprawności fizycznej zastosowano test Fullerton. Zaobserwowano zmniejszoną sprawność fizyczną w grupie chorych na POChP, w porównaniu z badanymi z grupy kontrolnej.

Słowa kluczowe:

test fullerton, POChP, sprawność fizyczna

Abstract

The aim of this study was to assess the physical fitness using Fullerton test in COPD patients over 60 years old. Study group consisted of 53 patients with COPD. Control group consisted of 34 healthy individuals students of the University of the Third Age in Głucholazy. To assess the physical fitness Fullerton test was used. There was a reduced physical fitness in patients with COPD, compared to the control group.

Key words:

Fullerton test, COPD, physical fitness

Introduction

Chronic obstructive pulmonary disease (COPD), is one of the most common chronic respiratory diseases in the elderly population. Currently, COPD is considered to be the systemic disease. The most important extrapulmonary symptoms, correlated with age are a reduction in skeletal muscle mass, strength and nutritional status disorders, thereby reducing the physical activity. Restriction of physical fitness is associated with morbidity and mortality in COPD patients [1]. With increasing severity of the disease, including airway obstruction and dyspnea level, found a decrease in the level of physical activity, which affects the reduction of physical fitness and capacity [2]. Eurofit test [3, 4, 5], Up and Go standard and extended (6), 10 and 100-meter walk test, 6 and 12-minute walk test, going up the stairs and a test on a treadmill or bicycle ergometer (7) are useful tests allowing assess exercise tolerance and physical fitness. Fullerton test in spite of its simplicity and ease of conduct is rarely used. It allows for evaluation of physical indicators of COPD, may also be useful in the qualifications for rehabilitation and to compare its results. It allows for an assessment of physical fitness indicators of COPD patients, may also be useful in the qualifications for rehabilitation and to compare its results. However, no comprehensive studies using this test to assess the physical fitness of patients with COPD. In this work it was decided to make an attempt to assess some characteristics that determine the physical fitness of patients with COPD and compare them with healthy people in the same age range.

Aim

The aim of the study was to assess the physical fitness using Fullerton test in patients with COPD.

Subjects and methods

The research material consisted of 53 COPD in patients (41 males, 12 females) of MIAA Specialistic Hospital in Głucholazy, who were treated there from February to May 2013. The average age of patients was 69 years (+/-5.95). Patients were randomized to the study. Patients were qualified to the model B of pulmonary rehabilitation program, according to the result of the 6-minute walk test, spirometry (FEV1 60-70%), and dyspnea level less than 3, according to the Borg 10-point scale. The exclusion criteria from the study were musculoskeletal dysfunctions and diseases that may affect the reduction in physical fitness, including acute bronchitis, pneumonia, tuberculosis, asthma, heart attack, the state of post-CABG atrial fibrillation, heart failure, paresis, cancer, ankylosing spondylitis, rheumatoid arthritis, pain in extremity, degenerative arthritis.

The Functional Fitness Test was used to assess the physical fitness. The test was conducted prior to the rehabilitation process.

The control group were randomly selected 34 healthy subjects (20 women and 14 men), students of the University of the Third Age in Glucholazy. The average age of the respondents was 66.5 years (+/-3.02) (Tab. 2). In all patients in this group, there were no diseases and dysfunctions limitations.

Fullerton test was performed in all patients in the same way under the same measurement methods.

Table 1. The eligibility criteria for COPD patients to the appropriate model of rehabilitation

Spirometry	Energy expenditure			
	<3 MET	3 - 4,9 MET	5 - 6,9 MET	≥ 7 MET
<30 %FEV1	D	D	C	B
30-50 %FEV1	D	D/C	C/B	B/A
50-80 %FEV1	D	C	B	A
>80 %FEV1	D	C	B	A

Table 2. Characteristics of groups

Spirometry	age [years]	body mass [kg]	body height [cm]
Study group	69,09 ±6,22	76,94 ±17,03	169,94 ±6,08
Control group	66,53 ±3,02	73,09 ±11,41	161,74 ±6,31

Fullerton test

"Functional fitness test" otherwise known as a Fullerton test, published in 1997 by physiotherapists Robert Rikli and Jessie Jones at the University of California at Fullerton, enables a simple and reproducible manner, the assessment of physical fitness parameters in patients over 60 years of age. In six motor tasks evaluated: strength endurance, flexibility, agility, aerobic capacity, balance and motor coordination [8, 9, 10].

Fullerton test consists of the following motor tasks:

1. Arm curl

Purpose: To assess upper body strength, needed for performing household and other activities involving lifting and carrying things such as groceries, suitcases and grandchildren. The back is outstretched, the feet resting flat on the ground. A handle weighing 2 kg for women or 3.5 kg for men is held in the dominant hand.

2. Chair stand

Purpose: To assess lower body strength, needed for numerous tasks such as climbing stairs, walking and getting out of a chair, tub or car. Also reduces the chance of falling. Number of full stands that can be completed in 30 seconds with arms folded across chest.

3. Back scratch

Purpose: To assess upper body (shoulder) flexibility, which is important in tasks such as combing one's hair, putting on overhead garments and reaching for a seat Belt. With one hand reaching over the shoulder and one up the middle of the back, the number of inches (cm) between extended middle fingers (+ or -).

4. Chair sit and reach

Purpose: To assess lower body flexibility, which is important for good posture, for normal gait patterns and for various mobility tasks, such as getting in and out of a bathtub or car. From a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe.

5. Foot-up and go

Purpose: To assess agility/dynamic balance, which is important in tasks that require quick maneuvering, such as getting off a bus in time or getting up to attend to something in the kitchen, to go to the bathroom or to answer the phone. Number of seconds required to get up from a seated position, walk 8 feet (2.44 m), turn, and return to seated position.

6. 6 min walk test

Purpose: To assess aerobic endurance, which is important for walking distances, stair climbing, shopping, sightseeing while on vacation, etc. Number of yards/meters that can be walked in 6 minutes around a 50-yard (45.7 meter) course. (5 yds = 4.57 meters).

Statistical methods

The non-parametric Wilcoxon test was used, assuming a significance level for all tests, $p < 0.05$.

The obtained values of 6 trials Fullerton test in the study group and the control, compared to existing data standards for the ages and genders by Rikli & Jones. In the study group in each of the tasks observed increased percentage of the value of the indicators do not fall within the standards by Rikli & Jones. In both study groups was observed prolongation of the test, Foot-up and go requiring the ability to maintain balance, agility and rapid response to change the position of the body in space (Tab. 3).

Table 3. The percentage of values below the standards for each of the test trials Fullerton in both groups

	PC Arm curl	WS Chair stand	ZD Back scratch	SRS Chair sit and reach	WI Foot-up and go	TK6M 6-minute walk test
Study group	11.3 %	18.8%	13.2%	28.3%	62.3 %	24.5%
Control group	5.7%	2.85%	5.7%	2.85%	45.7%	11.4%

Results

Analysis of the results was prepared at the average values of the individual trials of Fullerton test (Tab. 4).

Table 4. Averaged.Fullerton test results

	PC Arm curl	WS Chair stand	ZD Back scratch	SRS Chair sit and reach	WI Foot-up and go	TK6M 6-minute walk test
Study group	17.08 ±3.20	14.51 ±3.20	-11.52 ±9.82	-4.15 ±8.34	6.57 ±1.23	505.21 ±64.05
Control group	17.76 ±4.36	14.26 ±3.75	-5.84 ±7.39	0.03 ±4.19	8.10 ±9.34	504.08 ±134.01

To study differences in values of the individual tests, between the two study groups was used the non-parametric Wilcoxon test at the level $p < 0.05$.

The average value of the trial „Arm Curl” assessing strength endurance of the upper body in a group of patients was 17.08 (± 3.20), and the control group 17.76 (± 4.36) repetitions. Analysis did not show statistically significant differences (Fig. 1).

The average value of the trial "Chair stand" assessing strength endurance lower body in patients was 14.51 (± 3.20), and the control group 14.26 (± 3.75) repetitions. Analysis did not show statistically significant differences (Fig. 2).

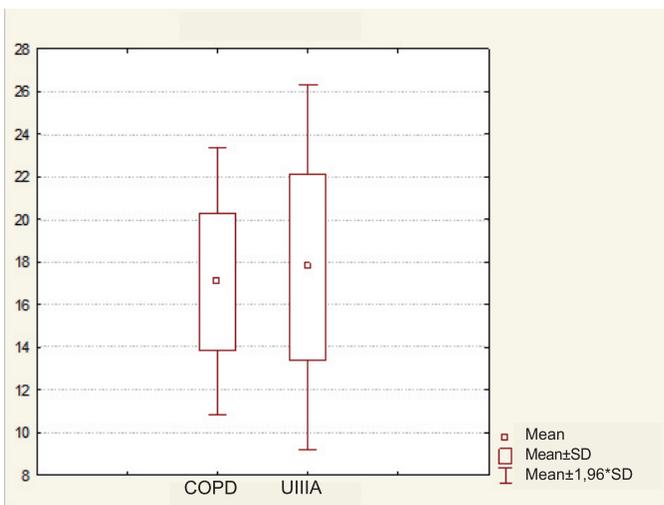


Fig. 1. Differences of values of the trial "Arm curl"

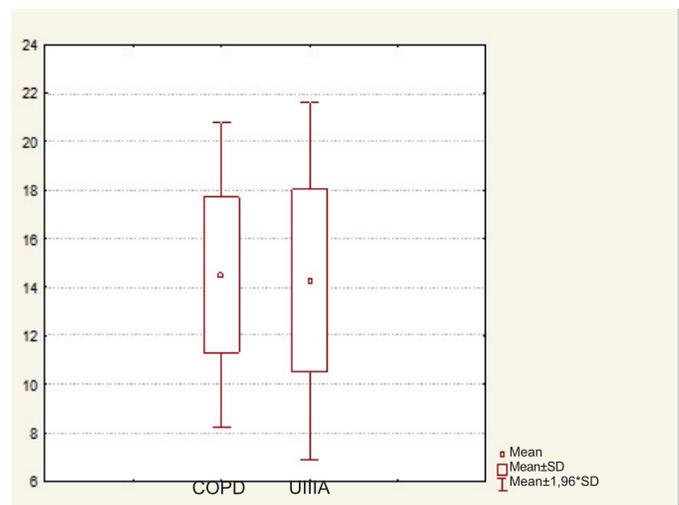


Fig. 2. Differences of values of the trial "Chair stand"

The average value of the trial „Back scratch” assessing of the upper body flexibility in patients was $-11.52 (\pm 9.8)$, and the control group $-5.84 (\pm 7.4)$ cm. It was found that the differences between the two groups are statistically significant (Fig. 3).

The average value of the trial "Chair sit and reach" assessing flexibility of the lower part of the body in patients was $-4.15 (\pm 8.3)$, and the control group was $0.03 (\pm 4.19)$ cm. Analysis did not show statistically significant differences (Fig. 4).

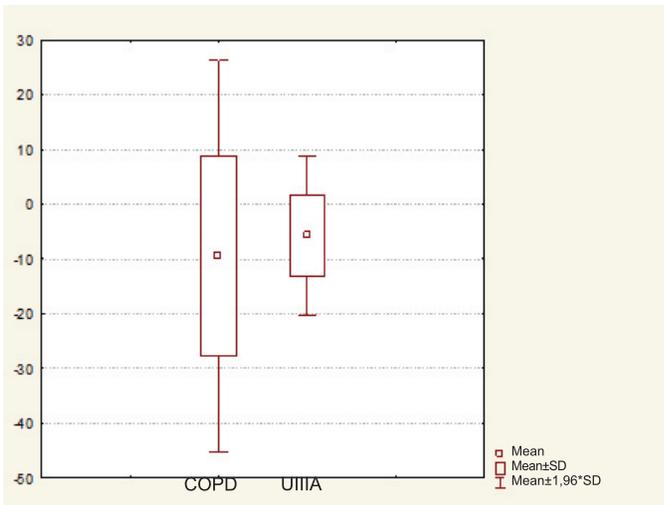


Fig. 3. Differences of values of the trial "Back scratch"

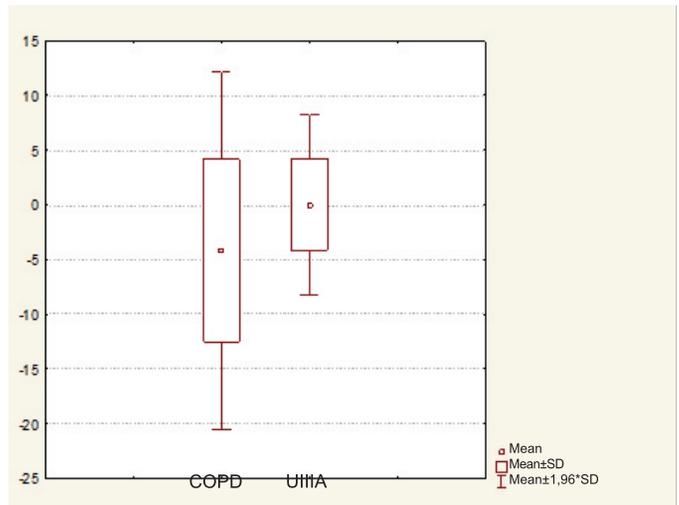


Fig. 4. Differences of values of the trial "Chair sit and reach"

The average value of the trial „Foot-up and go” assessing dynamic balance and agility in patients was $6.57 (\pm 1.23)$, and the control group $8.10 (\pm 9.34)$ s. Analysis did not show statistically significant differences (Fig. 5).

The average value of the trial „6-minute walk test” assessing exercise tolerance in patients was $505.21 (\pm 64)$, and the control group $504.08 (\pm 134)$ m. Analysis did not show statistically significant differences (Fig. 6).

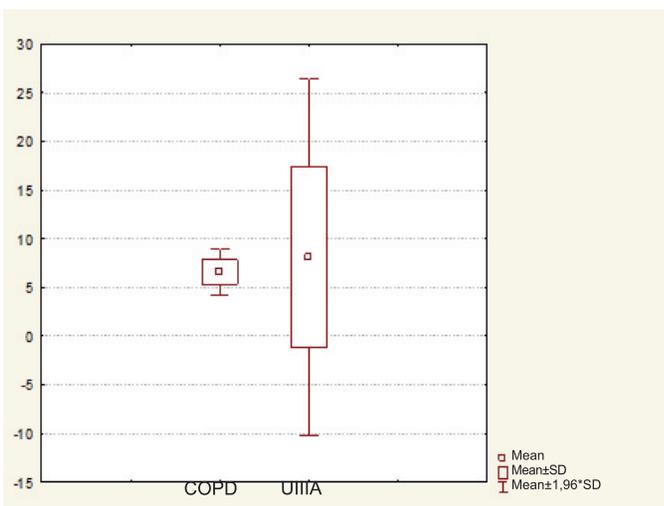


Fig. 5. Differences of values of the trial "Foot-up and go"

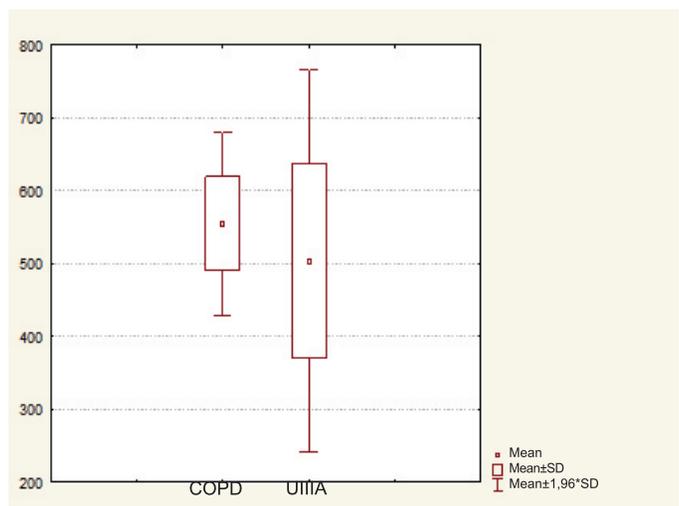


Fig. 6. Differences of values of the trial "6-minute walk test"

Discussion

Assessment of physical fitness is an important prognostic indicator of morbidity and mortality in chronic disease. The physiotherapy uses simple tests to determine the level of physical fitness [3, 4, 5].

Functional Fitness Test mainly was used to assess the physical fitness of people over 60 years of age [8, 9, 10], and to evaluate the effects of physiotherapy. Test Fullerton, due to its simplicity and ease of implementation is used in lung cancer patients in order to assess the effects of physiotherapy. It was found that Functional Fitness Test in a reliable manner determines the changes in the process of rehabilitation of patients with lung cancer [11]. Is also used as a tool to help in qualify for the appropriate models of pulmonary rehabilitation [12]. In the available literature, there is a lack of comprehensive studies with the use of simple tests for the assessment of physical function in patients with chronic obstructive pulmonary disease. Previous studies relate to changes in the assessment of exercise capacity and respiratory muscle strength in these patients. Examined the lower limbs muscle dysfunction in COPD patients on the example of the quadriceps muscle [13, 14, 15]. The results indicate a reduction in strength and endurance of the muscle, compared to healthy subjects of similar age. It has been shown that the strength of the quadriceps significantly correlated with exercise capacity in patients with COPD. Butcher et al. in their work did the experimental evaluation of coordination and balance in these patients in a standing position. COPD patients compared to healthy individuals, have limitations in the implementation of the various motor tasks as well as in the maintenance of equilibrium [16]. The study also showed that adequate training is useful for improving strength endurance, flexibility, muscular, dynamic balance and coordination and exercise tolerance in these patients [17].

In our study did not show statistical significant differences in Fullerton test between patients with COPD and healthy people from the same age group. Should be assumed that examined patients in this phase of disease, there were no significant changes in limiting the exercise capacity and physical fitness.

Was noted statistically significant differences in the values of indicators of the flexibility of the upper part of the body. In COPD patients have demonstrated reduced flexibility, which may be associated with setting inspiratory chest.

Conclusions

1. Studies have reported in patients with COPD lower values of indicators of physical fitness.
2. It has been shown in patients with COPD, in comparison with the control group studied, significantly lower values of indicators of flexibility of the upper body.

3. Fullerton test may be useful in the assessment of physical fitness in patients with COPD.

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