

Effects of Physical Activity on the Physical Condition and Quality of Life of Elderly People

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ABSTRACT

Background: The article raises a topical scientific problem regarding the physical inactivity and low physical capacity of the elderly population, the indicators of which, according to researchers in old age, can help predict institutionalization, disability, or even the risk of premature death. Various organizations around the world are striving to increase the number of physically active people by raising awareness and developing preventive measures. In this study, we looked for optimal activities that can effectively improve the physical capacity and quality of life self-assessment of older people.

Methods: Eurofit tests were used to assess physical capacity (Jones, & Rikli, 2002). The study assessed the physical capacity of elderly people to determine body composition, motor system capacity, skeletal muscle capacity, and cardiovascular capacity. A shortened version of the WHO questionnaire (World Health Organization Quality of Life 100 - WHOQOL-100), WHO-BREF-26 was used to assess quality of life (World Health Organization, 2012).

Results: The indicators of quality of life of the subjects did not improve in a statistically significant way after physically energetic activities – exercise, swimming and Nordic walking. The indicators of physical capacity of the subjects improved in a statistically significant way after physically energetic activities. The three-month exercise increased hand muscle strength and body composition, swimming activity increased hand muscle strength, upper body flexibility and motor system performance indicators, Nordic walking statistically significantly improved upper body flexibility.

Conclusions: Different physical activity activities significantly improve different components of physical capacity.

Keywords: physical activity, elderly people, physical capacity.

INTRODUCTION

In recent years, special attention has been paid to physical activity in modern society. The problem of a sedentary lifestyle is relevant and has been addressed for many years, however, the population in Lithuania – and in the world – is still not physically active enough (World Health Organization, 2021). According to statistics, about 8 percent of the world's population are older than 65 years, which amounts to over 500 million of the more than 7 billion people living in the world. It is

believed that by the year 2050, these numbers could double, to reach as much as 16.5 percent. Up to 5 million premature deaths could be prevented each year if the population around the world were to be more physically active. For people who are not physically active enough, the risk of death increases by 20–30 percent, compared with those whose activity is sufficient (World Health Organization, 2020). Much attention of health organizations and specialists of physical activity has recently been

dedicated to the diversity of physical activities and the differentiation of activities according to the age of population, physical preparation to customize individualized, optimal and physical exertion beneficial for health. The overall functional capacity of elderly people and good physical condition are closely linked to a better quality of life and self-contained satisfaction of daily needs. Aging increases the risk of a sedentary lifestyle due to a variety of social, economic and physical factors (Chung, Zhao, Liu, & Quach, 2017). Personal experiences of elderly people engaging in physically active activities provide an opportunity to assess how their self-assessment of quality of life is changing and physical condition after interventions of physical activity. After finding out the activities that have the greatest positive impact on the population, it is possible to provide practical recommendations focused on a quality physical activity service in order to have a positive impact for the population of elderly people on their physical activity, capacity and quality of life indicators.

METHODS

The study assessed the physical capacity of elderly people in order to determine body composition, the capacity of the motor system, the skeletal muscular system, and the cardiovascular system. (Jones, & Rikli, 2002).

To assess body composition, body mass index (BMI) was determined using the formula: kg/m^2 to evaluate body composition and the likelihood of becoming overweight or obese. Waist circumference measurements were also taken to assess the amount of visceral adipose tissue in the mid-torso.

For evaluation of the musculoskeletal system:

“Sit and reach” test to assess lower body flexibility.

“Behind the back-arm reach” test to assess upper body (shoulder girdle) flexibility.

“Hand Squeeze” test to assess hand muscle strength.

“Stand and sit (squat) in 30 seconds” test to assess lower limb (leg) muscle strength.

“Weighted arm bend and extension in 30 seconds” test. Objective – to assess upper limb (arm) muscle strength.

For evaluation of cardiovascular system capacity:

“2-minute marching in place” test to assess cardiovascular system performance (aerobic endurance).

For evaluation of motor system capacity:

“Stand and go” test to assess coordination, dynamic balance and agility.

“Balance assessment” test.

For assessing quality of life, the short version of the WHO questionnaire WHO-BREF-26 was used. The questionnaire is a 26-question questionnaire developed on the initiative of the WHO. It consists of two general questions to assess the quality of life and satisfaction with health, and 24 questions divided into 4 sections: physical, psychological, social and environmental. The Lithuanian version of the validated questionnaire is available on the WHO website: <https://www.who.int/tools/whoqol/whoqol-bref>.

The subjects were briefed on the aim, objectives and importance of the study and all the testing methods. A questionnaire was used to determine the subjects’ readiness to participate in the study.

The study was conducted with the permission of the Bioethics Committee and the written consent of the participants. After the assessment of physical capacity and quality of life, the subjects were evenly divided into three groups and regularly participated in physical activities: exercising, swimming or Nordic walking. Hour-long activities took place over three months, twice a week.

Physical capacity and quality of life were reassessed after physical activity intervention.

Calculations were carried out using the SPSS 20.0 (Statistical Package of Social Sciences) program. A T-test was used to compare the average scores after physical interventions. Sixty-eight subjects participated in the study, 63 women and 5 men from the Kaunas district. The age of the subjects was 65 years and above, the average age was 71 years. The subjects were healthy and free of chronic non-infectious diseases.

RESULTS

The indicators of quality of life of the subjects did not improve in statistically significant way after physically energetic activities – exercise, swimming and Nordic walking. We noticed a tendency for the self-assessment of the quality of life in social relations to deteriorate after training in the pool. The results may have been influenced by the individualized content of the activities, when there was no active communication with each other during the activities.

The indicators of physical capacity of the subjects improved in a statistically significant way

Table 1. Distribution of quality of life and physical capacity scores before and after different physical activity interventions

Quality of life assessment results before and after in-pool exercise intervention		V±SN	p
Social relations	Before workouts	10.83 ± 0.83	0.076
	After workouts	8.66 ± 3.52	
Physical performance assessment results before and after exercise intervention		V±SN	p
Waist circumference (cm)	Before workouts	98.00 ± 11.15	0.0001
	After workouts	95.06 ± 11.80	
Hand squeeze (kg)	Before workouts	24.41 ± 5.85	0.00007
	After workouts	26.76 ± 5.70	
Physical performance assessment results before and after in-pool exercise intervention		V±SN	p
Hand squeeze (kg)	Before workouts	24.91 ± 4.76	0.014
	After workouts	28.95 ± 5.61	
Behind the back arm reach (cm)	Before workouts	-11.5 ± 7.3	0.002
	After workouts	-3.8 ± 4.7	
Stand and go (sec.)	Before workouts	5.51 ± 0.94	0.026
	After workouts	4.90 ± 0.81	
Physical performance assessment before and after Nordic walking intervention		V ± SN	p
Behind the back-arm reach (cm)	Before workouts	-30.5 ± 13.4	0.028
	After workouts	-19 ± 12.7	

after physically energetic activities. The three-month exercise increased hand muscle strength and body composition, swimming activity increased hand muscle strength, upper body flexibility and motor system performance indicators, and Nordic walking statistically significantly improved upper body flexibility.

The subjects who exercised had a statistically significant decrease in waist circumference in centimetres ($p < 0.05$), from 98 cm before physical exercise to 95.06 cm after physical exercise activities. Significant increase in hand squeeze strength ($p < 0.05$) comparing 24.41 kg before exercising and 26.76 kg after exercising.

The subjects who participated in in-pool exercise showed statistically significant improvements in shoulder girdle flexibility, hand grip strength and walking speed and coordination ($p < 0.05$). Shoulder girdle flexibility improved from -11.5 cm before the workouts to -3.8 cm after the workouts. Hand squeeze strength increased from 24.91 kg before physical intervention to 28.95 kg after physical intervention. Walking speed and coordination went from 5.51 seconds before training to 4.90 seconds after training.

Shoulder girdle flexibility was statistically significantly improved ($p < 0.05$) in the subjects

who participated in Nordic walking physical activities. From -30.5 cm before physical activities to -19 cm after physical activities.

DISCUSSION

The subjects' quality of life did not show statistically significant improvements after physical activity – exercise, swimming and Nordic walking – regardless of the type of physical activity. The results of the study are not in line with the findings of many other studies, which show that exercise has a positive effect on quality of life. It contributes to reducing symptoms of depression and various health disorders (Dauwan et al., 2021), and has an impact on better emotional well-being, social and close environment relationships. According to researchers' recommendations, exercise programs should be applied to healthy individuals and patients with various health conditions to improve quality of life (Mardani, Pedram, Mazaheri, Haghani, & Vaismoradi, 2021; Odynets, Briskin, & Todorova, 2019; Taylor et al., 2019). Those who take part in swimming have better psychological quality of life indicators compared to those who are physically inactive. Nordic walking has a positive impact on the quality of life of elderly people in various areas

(Albuquerque-Maranhao, Pereira-Junior, Mura, Giovanni-Carta, & Machado, 2015; Šokelienė, Adomavičienė, 2011).

The subjects' physical performance improved significantly after physical activities – exercising, swimming and Nordic walking. Analysis of the scientific literature shows a strong correlation between optimal physical activity and body weight. The reduction in waist circumference in our study supports this, as waist measurements assess the amount of visceral adipose tissue in the mid-torso. The improved arm muscle strength results after exercise interventions are consistent with the results of a five-week study in Lithuania, where exercise improved the subjects' arm functional condition and the amplitude of extension and flexion movements. Combining kinesiotherapy exercise with strength and stretching exercises can significantly improve hand function, according to researchers (Želvytė, & Čekauskaitė, 2020). The lack of a positive change in other components of physical performance after exercise intervention may have been influenced by the type and duration of the exercise activities, as well as the lack of engagement of the participants in these activities. In order to make a positive difference, it is important to ensure that the exercise program for elderly people includes aerobic, resistance, flexibility and balance training exercises. Personalization and safe performance of exercises, as well as sufficient intensity, volume and duration are essential (Galloza, Castillo, & Micheo, 2017).

After swimming workouts, we observed a significant positive change in the subjects' shoulder girdle flexibility, arm muscle strength and motor system capacity indicators. According to researchers, regular water exercise can reduce joint pain and poor mobility and increase muscle strength in middle-aged and older people (Alkatan et al., 2016). Swimming improves overall muscle function and range of motion, which is consistent with the results of our study. Swimming can also influence positive changes in the cardiovascular system (Wong et al., 2019). The lack of a significant positive change in these factors could be due to

insufficient activity intensity. To improve indicators of cardiovascular system health, appropriate intensity of physical activity is needed, according to some researchers – moderate to high (Tornberg et al., 2019).

Nordic walking improved the subjects' shoulder girdle flexibility, but other researchers have noted wider and more varied benefits of Nordic walking for the human body. Nordic walking has an impact on increasing range of motion, improving impaired physical function, easing activities of daily living, and can improve shoulder girdle flexibility during flexion, retraction and external rotation of the shoulder joint (Fischer et al., 2019). Longer duration Nordic walking training is beneficial for muscle strength, flexibility, coordination, dynamic balance and aerobic capacity in elderly people (Samlani, Lemfadli, Errami, Oubaha, & Krati, 2021).

Our findings were consistent with those of other authors who have shown that exercise, in-pool training, Nordic walking and many other physical activities have a positive effect on physical capacity, but it is important to use interventions with a variety of different physical activities to achieve multiple benefits for all components of human physical performance, taking into account the fact that different activities improve different components of physical capacity.

CONCLUSIONS

Physical activity had a significant positive effect on the indicators of physical condition of the elderly people. Exercise improved the palm-compression force and indicators of waist circumference of the subjects; swimming – palm-compression force, shoulder band mobility and walking speed as well as coordination; Nordic walking – shoulder band mobility.

Physical activity did not have a significant positive effect on the quality of life of elderly people.

Exercise, swimming training and Nordic walking did not improve the quality of life indicators of older people in the physical, psychological, social and environmental fields.

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