

# The Role of Pilates and Aquafitness Exercises in Sustaining the Health and Fitness of Elderly Women

Dariusz BOGUSZEWSKI<sup>1</sup> • Monika SŁODKOWSKA (CIEŚLIK)<sup>1</sup>  
Jakub ADAMCZYK<sup>1,2</sup> • Andrzej OCHAL<sup>1</sup>

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*Background:* The aim of this study was an evaluation of the effectiveness of two forms of physical activity: Pilates and aquafitness – gymnastics in water, in sustaining the health and fitness of women after the age of 55. *Material and methods:* In research groups were twenty five volunteer women – participants of physical training of the age from 55 to 76 years. One of the groups (Group 1) conducted exercise according to the Pilates method, and the second group (Group 2) practiced in water – aquafitness. The exercises took place once a week, 1.5 hours each. The research (“up and go” test, test for strength and endurance of lower limbs, test for strength of upper limbs, test for suppleness of the lower body part) has been conducted twice – in the first four weeks of training and after ten weeks. *Results:* The strength of upper limbs considerably increased ( $p=0.038$ ) in the case of women practicing in water. The program of aquafitness contains a lot of resistance exercises for the upper limbs, which had impact on the above mentioned result. Improvement in the results of tests of suppleness of lower body part was observed (after an 10-week cycle of exercises) in Pilates groups. *Conclusions:* Pilates and aquafitness were beneficial for the level of suppleness of seniors. The frequency of exercises – once a week – is insufficient for sustaining full fitness, however, even such minimal doze of physical activity positively affects the physical and mental condition of the seniors.

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*Keywords:* elderly, training, Pilates, aquafitness

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1 Rehabilitation Department, Medical University of Warsaw, Poland

2 Theory of Sport Department, University of Physical Education in Warsaw, Poland

## Introduction

The development of science, medicine and technology, as well as the development of prosperity changed the human way of life and functioning. Life became easier. All of this prolonged the human life span. As a result of a change in the mortality rate, we are more often facing the phenomenon of physiological old age, and a decrease of biological potential. A visible effect of this state of affairs is a decrease in fitness and a loss of full independence of the elderly (Kostka 2001, Osiński 2002, Twardowska-Rajewska 2007, Dziechciaż et al. 2011).

As in many other countries, the population of the elderly is growing year by year. Demographic data indicates that over 16% of the Polish population are women after the age of 60 and men after the age of 65. This number may increase up to 25% in 2030, which means that every fourth Pole will be retired by then (Osiński 2002). One of the problems of contemporary medicine is care for the elderly, guaranteeing their longest possible, satisfactory and independent life (Twardowska-Rajewska 2007, Thomopoulou et al. 2010).

Health is a both physical and mental state of well-being, and not a sense of a lack of illness or disability. The quality of our lives and the way we age is influenced by the factors we cannot modify and factors which change. The former are genetics and the environment. The latter are diet and physical activity. A proper lifestyle will guarantee a longer, healthier life (Zajac-Gawlak & Polechoński 2007, Kozak-Szkopek & Galus 2009, Leś & Gaworska 2011).

Due to the establishment of a growing offer for seniors assuming various forms of physical activity, it is essential to find what is the best for them and what will allow for reaching the highest fitness and retaining it for the longest time possible.

The purpose of the research was an evaluation of the effectiveness of two forms of physical activity: Pilates and aquafitness – gymnastics in water, in sustaining the health and fitness of women after the age of 55.

Detailed research goals refers to the settlement of the following research questions:

1. Do Pilates and aquafitness physical exercises have considerable impact on the level of physical fitness of examined women?

2. Which of the forms of physical activity – Pilates or aquafitness – is more effective in sustaining the health and fitness of women?
3. How Pilates and aquafitness exercises are evaluated by their practitioners and what are their preferences concerning their physical activity?

### **Material and Methods**

The examined people were 25 female participants of physical training organized as part of the “Senior – Older – Fitter” program (financed by the Municipal Office of the Capital City of Warsaw) of the age from 55 to 76 years (in average 62.5; SD=7.43). One of the group (Group 1) conducted exercise according to the Pilates method (stretching and strengthening in the surrounding of calm music) (Sheddem & Kravitz 2006, Monroe 2010, Mc Gonigal 2010, Zagura & Lesko 2010), and the second group (Group 2) practiced in water – aquafitness (aerobic exercises, strengthening and stretching to the rhythm of energetic music) (Mosakowska 2007, Graef et al. 2010). The majority of practitioners (60%) has not attended similarly organized physical training before. The characteristics of both groups are included in table 1.

The exercises took place once a week, 1.5 hours each. The research has been conducted twice – in the first four weeks of training and after ten weeks.

Table 1. Characteristic of research groups

	type of exercise	number of people	average age [years]	percentage of newcomers
Group 1	Pilates	15	64,9 ± 7,18	53%
Group 2	Aquafitness	10	58,9 ± 5,01	70%

Four functional tests were applied to examine the physical fitness of participants [2].

1. Test of agility, dynamic balance, walk alone – “up and go” (get up and go). The examined person sits in a chair. Gets up (on the signal) and goes as soon as possible (not run) to the end of the hall (24 m). Evaluations of the time covering the distance, including getting up from his chair.

2. Test for strength and endurance of lower limbs – walking up the stairs. The examined person is told to walk up the stairs (20 stairs) after a signal in the tempo, in which she usually does it. The time of walking up the stairs is measured.
3. Test for strength of upper limbs – bending forearms. The examined person is sitting on a chair, back rested, feet on the floor, holding a 1 kg weight in the stronger hand, elbow resting on the torso. On signal, the examined person lifts the weight in a lower position along the chair, bending the forearm to the moment of touching the arm with the weight; we are examining the strength of upper limbs thanks to the measurement of the number of bends performed within 30 seconds.
4. Test for suppleness of the lower body part – “reach to the toe”. The examined person is sitting on a chair, legs positioned in the right angle in relation to the ground, pulls one leg straight, toes up, performs a bend without moving buttock off the chair; examination with tailor’s measuring tape – the distance for the middle finger to the toe – the distance defines the suppleness of the lower body part.

The participants of the training also filled in an authorial questionnaire, expressing opinion concerning the training, own mood and influence of the exercises on general condition.

Impact of two method of physical exercise of mental health was assess. This part of the research was conducted under the supervision of a sports psychologist. Research tool was Spielberger Self-evaluation Questionnaire measuring the level of anxiety. The probe consists of two parts. The first concerns anxiety as a state – currently, at the moment of examination (STAI X-1). The examined person, defining their mood, may choose one of the following answers: “definitely not”, “rather not”, “rather yes”, “definitely yes”. The second part (STAI X-2) defines the level of anxiety as a trait (feature), which is a continuous predisposition. The examined people choose among the following answers: “almost never”, “sometimes”, “often”, and “almost always”. Both parts contain 20 questions, and, in every part, the scale of results hovers from 20 to 80 points (Wrześniewski et al. 2002).

The description of data is performed with the use of arithmetic data, standard deviation and the t-Student test, assuming a minimal level of changeability of  $p < 0.05$ .

## **Results**

Insignificant progress of „up and go” test results were observed in Pilates and aquafitness groups.

In Group 1 (practicing in the gym), the results of the tests of strength and endurance of lower limbs (walking up the stairs) were nearly identical in the first and second measurement. An important statistical difference ( $p=0.014$ ) – progress of results was observed in Group 2.

The strength of upper limbs considerably increased ( $p=0.038$ ) in the case of women practicing in water. The program of aquafitness contains a lot of resistance exercises for the upper limbs, which had impact on the above mentioned result. Pilates is dominated by stretching exercises, hence their effect on the strength of upper limbs was lower.

With reference to suppleness of the lower body part, progress was observed in the group of women practicing in water (Group 1 – Pilates). A deterioration of results was observed in group 2. Differences were not significant.

After the 10-week cycle of training, the participants of the training filled in a questionnaire grading its program, the method it was conducted and the impact of the exercises on their health and mood. The majority of participants (from both groups) positively graded the exercises they performed.

In the purpose of diagnosis of psychological state of examined people was used Spielberger Questionnaire. Trend of decreasing of anxiety level (in both examined groups) was observed. The biggest differences, close to statistical significant was noticed in the level of state anxiety in Group 2 ( $p=0.061$ ) and trait anxiety in Group 1 ( $p=0.055$ ) (Tab. 2).

Table 2. Average results of physical fitness tests and anxiety level (by Spielberger Questionnaire)

	PILATES			AQUAFITNESS		
	before	after	p	before	after	p
<b>“up and go”</b> (time [s])	9,51	8,63	0,095	6,54***	5,78***	0,147
<b>“walking up the stairs”</b> (time [s])	6,85	6,61	0,664	7,61	6,06	0,014
<b>power of upper limbs</b> (number of repetitions)	30,4	28,87	0,438	36,2	41,5**	0,038
<b>flexibility of lower part of body</b> (distance from the ground [cm])	1,33	0,93	0,413	0,2	0,3	0,343
STAI X-1	38,5	33,6	0,163	43,78	39,79	0,061
STAI X-2	45,2	37,3	0,055	45	42,56	0,154

Notes: \*\* differences between groups  $p < 0.01$ ; \*\*\* differences between groups  $p < 0.001$

All participants of Pilates (Group 1) liked their exercises. 87% percent of the participants of aquafitness (Group 2) responded positively to the same question. For 12% of them the exercises were too tiring, and 25% of them were tired after training (in Group 1 no participant graded the exercises as too tiring, 9% of participants claimed to feel tired after exercises). Music which accompanied the exercises was graded as good by 84% of Pilates and aquafitness participants. The majority of participants of aquafitness claimed that they felt an inflow of energy (88% of pollees), that they felt better (100%) and that they performed daily actions easier (75%). A slightly lower number of participants Pilates responded similarly to the same questions (Fig. 1).

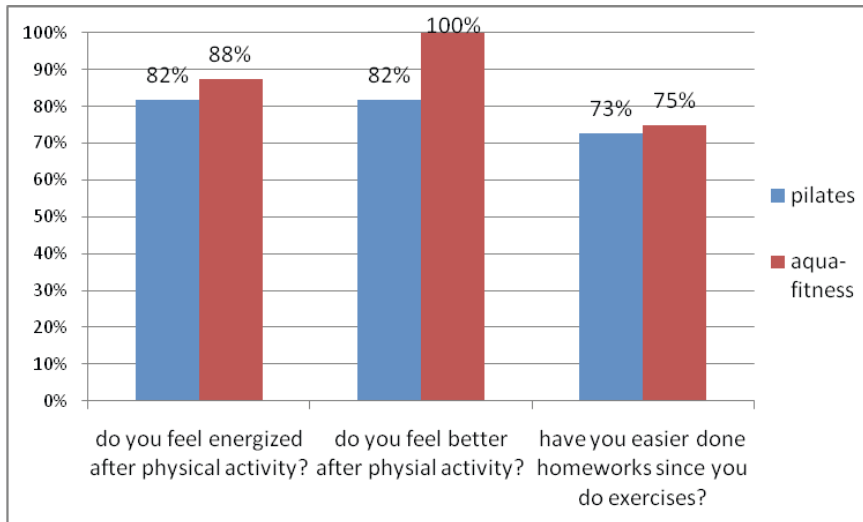


Figure 1. Opinion practicing Pilates and aquafitness on the impact of exercises on their own well-being.

The majority of people (73% of people from Group 1 and 75% of people from Group 2) experienced regular joint and spinal pains. Under the influence of the exercises, these pains diminished at 73% of Pilates practitioners and at 79% of aquafitness practitioners. Thanks to the exercises, it was easier for the seniors to maintain proper body posture. All participants of the exercises (both from Group 1 and Group 2) expressed will to continue the training, and 95% of them would recommend such physical activity to their friends.

The forms of physical activity which would be the best replacement for their current exercises (Pilates/aquafitness) was swimming. This fact was influenced by the participants' history of swimming (42% of participants attended swimming). One fourth of the participants performed tai-chi, and 16% – dancing. Particular attention should be drawn to Nordic Walking – over 1/5 of all participants expressed will to try marching with sticks. This is a proof of a growing popularity of this new activity, which is particularly recommended for the elderly, in our country.

## Discussion

Physical activity is a biological need of every human. Limitation of physical activity may lead to changes which are very often reversible, but full

recovery and recovery of well-being increases with the progress of inactivity. Scientific literature states the beneficial impact of physical activity of human body. Systematic physical activity may increase adaptive abilities of the organism in any age, preventing premature ageing and occurrence of illnesses (Malina 2002). Each physical activity produces different effects, focusing on various motor features. Research has proven that it is best to perform various types of gymnastics, depending on personal preferences, at least three times a week, preferably every day for 30 to 60 minutes (Tyszkowska 2003, Skrzek 2007).

Gymnastics plays an important role in advanced age, when the body experiences involution changes. Despite varying, often contrary reports, research proves that physical activity allows for sustaining physical fitness for a longer time, and may serve as prevention to many cardiologic, orthopedic and even neurological conditions (Zajac-Gawlak & Polechoński 2007, Leś & Gaworska 2011, Merati et al. 2011).

Research made by Paffenbarger (1994) confirms the claim that gymnastics prolongs life. Inactive people tend to live shorter. Furthermore, Tauton et al. (1996), applying home activities as endurance training, has displayed an increase in fitness and efficiency as well as increase of muscle strength at women after the age of 70. Blumenthal et al. (1987) reached contrary results, observing the endurance training of seniors. They claimed that after four months of regular exercise, the level of strength of the upper limbs did not change at the examined people. The strength training recommended by specialists, applied at women as the preventive treatment of osteoporosis, also in the opinion of Larson (1982), does not bring about effects in the form of muscle strength increase.

For the purpose of this work, simple tests which may be performed everywhere without the use of expensive equipment, were used. Moreover, the tests may be conducted several times, acquiring results without considerable financial expenses, which is their undoubtable advantage.

The results of tests could have been influenced by factors (e.g. illnesses) which were not the subject of research. It should be also emphasized that sustaining the level of fitness on a fixed level in this group of participants is a positive effect of the exercises itself.

Facilities organizing exercises as part of programs financed by local authorities, aiming at covering the highest possible number of people, introduce limits to the number of trainings per week. Only few have a possibility of subscribing to several places in order to increase the frequency of training. Unfortunately, the number of seats in physical training exercises is still



insufficient, despite an increase in the number of facilities, in which seniors can practice. Such limitations also result from the lack of qualified personnel specialized in exercises for this particular age group.

### **Conclusions**

Propagating physical activity, encouraging seniors to active recreation, which would be a part of their daily routine, are all essential for contemporary medicine. The purpose of gymnastics for seniors is at least sustaining their current physical and mental condition or improving it.

The following conclusions were drawn from the research:

1. Pilates and aquafitness were beneficial for the level of suppleness of seniors.
2. Pilates proved to be more effective in sustaining (or increasing) the suppleness of the lower body part, and aquafitness proved to be more effective in sustaining (or increasing) the strength of upper limbs and the strength and endurance of lower limbs.
3. The practitioners graded positively both methods. In their opinion Pilates and aquafitness both resulted in an improvement of mood, reduction of pain (joint and spinal pain).
4. The frequency of exercises – once a week – is insufficient for sustaining full fitness, however, even such minimal dose of physical activity positively affects the physical and mental condition of the seniors.

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Dariusz BOGUSZEWSKI, PhD is currently an assistant professor in Rehabilitation Department in Medical University of Warsaw (Poland), where he has been for the last 7 years. He learned his PhD in Human Kinetics Science at the University of Physical Education in Warsaw (Poland). He began his research career examining various aspect of combat sports and martial arts training. His current research concern also the application of physiotherapeutic methods in sports training and adapted physical activity (physical activity of elderly people, pregnant women, people with disabilities). He publishes regularly in European scientific journals concerning in human kinetics. He can be contacted at: [dboguszewski@wum.edu.pl](mailto:dboguszewski@wum.edu.pl)

Monika SŁODKOWSKA (CIEŚLIK), is a physiotherapist in Bialoleka Medical Center and fitness instructor for elderly people. She graduated Medical University of Warsaw (Poland).

Jakub ADAMCZYK, PhD is currently an assistant professor in Rehabilitation Department in Medical University of Warsaw (Poland) and assistant professor in Theory of Sport Department in University of Physical Education in Warsaw (Poland). He learned his PhD in Human Kinetics Science at the University of Physical Education in Warsaw (Poland). His research area included various aspect of sports training, physical activity and adapted physical activity (physical activity of elderly people, pregnant women, people with disabilities). He publishes regularly in European scientific journals concerning in human kinetics.

Andrzej OCHAL, is a senior lecturer in Rehabilitation Department in Medical University of Warsaw (Poland), where he has been for the last 9 years. He graduated University of Physical Education in Warsaw (Poland). His research area include adapted physical activity and disabled sport. He is coach of Polish Paralympics Team of disabled table tennis.

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