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Aqua gymnastics and functional efficiency of women after 60 – pilot study

Gimnastyka w wodzie a sprawność funkcjonalna kobiet po 60. roku życia – badania pilotażowe

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ABSTRACT

Introduction and Aim: Aging of the society is a serious problem of the modern world. Elderly people often avoid physical activities which lead to sedentary lifestyle. One suitable forms of physical activity for elderly is aqua gymnastics. The aim of the study was to determine if a larger study, using the chosen methods is feasible. This study tested the hypothesis that performing a 16-week course of aqua gymnastic training would result in improved functional fitness in women aged over 60. **Material and Methods:** The trial included a sample of 20 women randomly selected from the 100 who responded to the application of research. The measurements such as height, weight, waistline and hip width were conducted before and after a series of exercises in water. **Results:** After four-month-period of exercises in water an improvement in index value was due to weight loss, a slight decrease in waistline, the basis of the Fullerton Functional Fitness and an improvement in functional

STRESZCZENIE

Wstęp: Starzenie się społeczeństwa jest poważnym problemem współczesnego świata. Starsi ludzie często unikają aktywności fizycznej, co prowadzi do siedzącego trybu życia. Jedną z odpowiednich form aktywności ruchowej dla osób starszych jest Aqua gimnastyka.

Cel pracy: Celem badania pilotażowego było sprawdzenie, czy sprawność funkcjonalna osób starszych po 16-tygodniowym udziale w Aqua gimnastyce znacząco się poprawi. W badaniu założono hipotezę; że 16-tygodniowy trening Aqua gimnastyki skutecznie zwiększy sprawności funkcjonalną kobiet w wieku powyżej 60. roku życia.

Materiał i metoda: Badanie objęło 20 losowo dobranych kobiet spośród 100, które zgłosiły się do udziału w badaniach. Pomiary takie jak: wzrost, waga, obwód talii i bioder przeprowadzono przed i po serii ćwiczeń w wodzie.

Wyniki: Po czteromiesięcznym okresie ćwiczeń w wodzie zaobserwowano zmianę wartości pomiarów, odpowiednio;

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Participation of co-authors / Udział współautorów: A – preparation of a research project / przygotowanie projektu badawczego; B – collection of data / zbieranie danych; C – statistical analysis / analiza statystyczna; D – interpretation of data / interpretacja danych; E – preparation of a manuscript / przygotowanie manuskryptu; F – working out the literature / opracowanie piśmiennictwa; G – obtaining funds pozyskanie funduszy / pozyskanie funduszy

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efficiency of all tested women was observed. **Conclusion:** After 16 weeks of aqua aerobic in the group of women aged over 60 a significant functional fitness improvement was observed.

Keywords: aqua gymnastic, physical activity, Fullerton Functional Fitness

spadek masy ciała, niewielki spadek obwodu talii. Na podstawie Fullerton Functional Fitness test stwierdzono poprawę wyników wszystkich prób sprawności funkcjonalnej badanych kobiet. **Wniosek:** Zaobserwowano znaczną poprawę sprawności funkcjonalnej kobiet w wieku powyżej 60. roku życia po 16-tygodniowym Aqua aerobiku.

Słowa kluczowe: gimnastyka w wodzie, sprawność fizyczna, Test sprawności funkcjonalnej Fullertona

1. Introduction

Aging of the society is an extremely serious problem of the modern world. Adverse demographic changes pertain to highly developed countries, including Poland. Changes in demographic structure of the population are mainly caused by the decreasing population growth rate and lengthening of people's longevity mainly [1]. In Western Europe countries, including Poland, majority of the population are above average age. According to research by Matysiak and Nowak, Polish population will decrease from the current 38.2 million to 35.0 million in 2030 and the population may reach to 30.9 million by 2050. Along with the decline in its total population, Poland will face rapid population ageing [2].

Therefore; preventive and educational actions, promotion of active aging and implementation of activities improving the quality of life seem to be particularly crucial.

The aim of the above actions is to make people gain control over their own health through providing them with knowledge about effective ways of preventing diseases. Moreover, those actions would improve health condition of the whole society through creating favourable socioeconomic conditions.

Elderly people often avoid physical activities, which leads to sedentary lifestyle. They are so afraid of falling that they begin to limit their activity. Lack of exercise weakens muscle tone [3], body posture [4,5] and balance [6], and exacerbates joint stiffness due to illnesses like arthritis or osteoporosis. In addition, the isolation that comes from being housebound can lead to depression. Exercise is one of the most important factors having influence on health condition, mood, physical fitness and the quality of life in general. The lack or low physical activity is one of the main causes of circulatory system disorders development as well as other chronic diseases On the basis of research, it has been established that regular exercise can reduce mortality rate for about 25–30% [7].

Aqua gymnastics is the one of the forms of physical activity which is suitable for the elderly people. Water aerobics can lead to a reduction of blood pressure and resting heart rate [8]. Exercises in water are safer, effective and attractive form of physical activity for elder people due to low load on the spine and lower limbs joints. It is a new area of health promotion in Poland.

2. Paper's purpose

The aim of the pilot study was to determine if there were significant improvements in functional fitness levels in older adults after 16 weeks of participation in aqua gymnastics.

This study tested the hypothesis that performing 45 minutes program, twice a week for four months aqua gymnastic would result in improved functional fitness of women aged over 60.

3. Material and method

The trial included a sample of 20 women randomly (using appropriate computer program) selected from the 100 who responded to the application of research (the mean age of 64,3 ± 4,9). The surveyed women were required to meet the following criteria: (1) age over 60 years, (2) lack of established diseases of the musculoskeletal system, (3) lack of any form of physical activity before the survey. Criteria for exclusion were as follows: (1) a variety of cardiac disease, (2) inability to perform a 15 minutes of continuous activity and (3) extreme obesity, (4) bad general feeling and (5) unstable angina pectoris. Randomization was performed by using appropriate computer program.

The group was subject to biometric examination such as height, weight, waistline and hip width. On the basis of the measurements obtained, a Body Mass Index (BMI) and a waist-hip ratio (WHR) were also calculated. During the program, women did not use the nutrition advice. None of them was on a diet.

A standard Fullerton Functional Fitness Test [9], is used to estimate the functional efficiency and can be used to test functional efficiency in the elderly [10]. The Fullerton Functional Fitness Test is useful for examination risk of falls for elderly [11].

The Fullerton test comprises 6 trials that enable an indirect assessment of the upper and lower body strength, aerobic endurance, motor coordination, and balance. Prior to commencing the test, the examined person should be instructed to perform the tasks as good as possible. Because the authors of the test use such units as: pounds, feet, and yards that do not have identical equivalents in the European countries, an adaptation of the test was necessary. In the original version, the handle weight was 5 pounds for women. Due to the fact that there is no handles weighing 5 pounds (that is 2.27 kg) available on the market, 2-kilogram handles for women were used.

Figure 1. Arm Curl

Figure 2. Back Scratch

The sequence of trials performance is strictly determined. The test begins with a task of forearm flexion – the Arm Curl (AC) (Figure 1), subsequently – the "back scratch" (BS) (Figure 2), rising from a chair (ChSt) (Figure 3), the "chair sit and reach"(ChS&R) (Figure 4), the "8 feet" trial Up-and-Go (Up&Go) (Figure 5). and the last option associated with participant's motor abilities 2-minute "step-in-place" (2-MS) (Figure 6).

Course and performance of the test

The arm curl – it is the method of assessing upper-body strength. The participant is sitting on the edge of a stabile chair, with seat height of 44 cm. The back is outstretched, the feet resting flat on the ground. A handle weighing 2 kg for women is held in the dominant hand. The arm is directed downwards, along the chair, perpendicularly to the floor. Participant's task is, at a command given by the testing person, to rotate the hand upwards while simultaneously flexing the extremity in the elbow (flexion with

Figure 3. 30-second Chair Stand

Figure 4. Chair Sit-and-Reach

supination), and subsequently to extend the extremity to its baseline position.

The testing person is sitting or kneeling aside on the dominant side of the examined person holding his fingers at a half-length of the participant's biceps in order to stabilize the arm and prevent arm flexion. If necessary, the examiner may also place his second hand behind the elbow of the examined person to ensure that the participant performs full extension. Total number of correctly performed forearm flexion's within 30 seconds constitutes the result of the trial (Figure 1).

Upper body flexibility trial – the "back scratch" is performed in the standing position. The dominant hand is placed over the ipsilateral shoulder with the fingers outstretched downwards as far as possible. The other hand is places behind the back with the palm directed to the outside and the fingers outstretched upwards to try to hold on to the fingers of the other hand (Figure 2). The testing person instructs the participant, how to position the hands so that the middle fingers are possibly close. Catching or pulling participant's fingers is not allowed. A 30-cm ruler is used for the test. The distance measured between the middle fingers of the hands is the result of the trial. If the fingers overlap, it is the positive value (+), if otherwise, it is negative (-). The results are reported with an accuracy of 0.5 cm.

Lower body strength trial involves standing up from the chair and sitting down on the chair of a 44-cm height. The trial is initiated by sitting on the chair, the feet resting on the floor, the hands crossed at wrists and held on the chest (Figure 3). At a command given by the examiner, the participant should perform possibly greatest number of standing-up cycles within 30 seconds. In case the time is up while the examined person has already assumed the standing position, the stand-up is considered complete and incorporated into the score. Number of performed cycles constitutes the test result.

Lower body flexibility trial – the "chair sit and reach", it determining primarily the elasticity of popliteal tendons. The participant is sitting on the edge of the chair. One leg is resting with the whole foot on the ground. The second, dominant, is outstretched, resting with the heel on the ground, the foot flexed at a right angle. The trial involves flexion forward maintaining the vertebral spine as straight as possible with the head positioned along the vertebral axis. The arms are outstretched forward and the hands placed on each other (the middle fingers at the dame height). The examined person is trying to touch the toes with the fingers (Figure 4). The reach of the flexion should be maintained for 2 seconds. During the test, rapid, powerful movements should be avoided and the pain threshold should not be exceeded. The distance measured between the middle finger and the first toe is the result of the trial. A positive value – "+" indicates that the fingers crossed the toe line, a negative – "-" value indicates that the fingers did not cross the toe line. The value is given with an accuracy of 0.5 cm.

Complex coordination trial – "8 feet" – the agility/dynamic balance. This trial serves to determine the agility and dynamic balance in association with participant's balance. The test is initiated in the sitting position on the chair. The hands are resting on the knees and the feet are resting flat on the ground. At examiner's command, the participant rises possibly quickly from the chair (push-off is allowed) and covers a distance measured from the edge of the chair to the pole and returns to the sitting position (2.44 m from the pole) as fast as possible. The distance to be covered should be free of obstacles, including the space beyond the cone/pole allowing performance of the turn. The movement track of this trial is presented in the Figure 5. During this trial, special caution should be exercised, whether the examined person properly controls his balance and the person should be helped if needed.

The time is measured from giving the command,

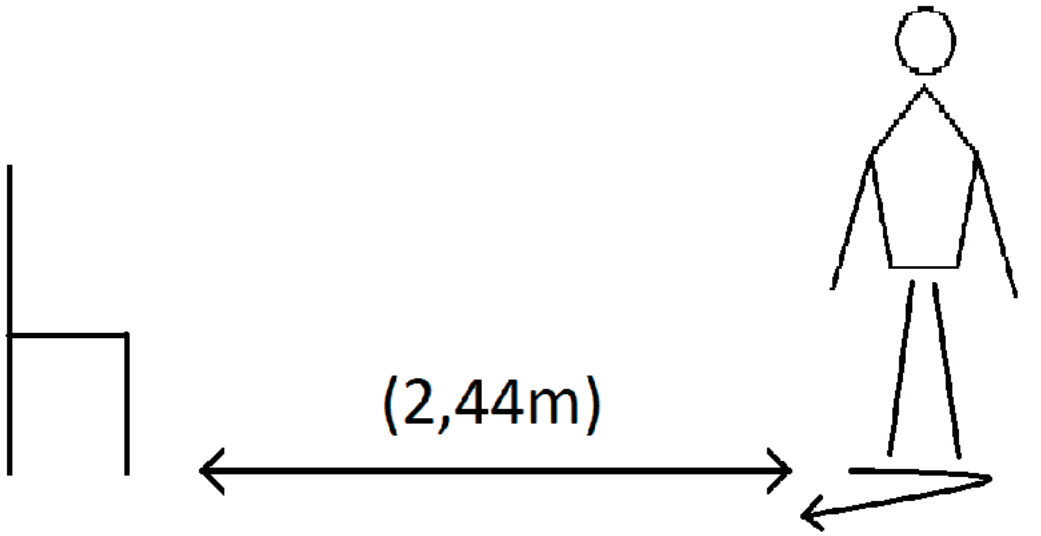

Figure 5. 8-Foot Up-and-Go

regardless of whether the participant reacted immediately following the command, to the complete return to the sitting position. The time needed to perform the task measured with 1/10-second accuracy constitutes the test result.

The 2-minute walk-in-place trial, named by the authors "step-in-place", is performed instead of the previously described 6-minute walking trial in case of persons, who use orthopedic devices during walking, as well as in case of persons with difficulties associated with maintenance of balance. The trial involves elevating the knees up to the level determined as a half of the distance between the patella and the iliac crest. This point should be marked in such a way that it is well visible. The participant's task involves alternating elevation of the legs, beginning with the right so that the knees reach the demarcated height (Figure 6). The examined person may lean onto a wall or other stabile supports. This allows persons requiring orthopedic aids while walking to perform the test. The examiner counts elevation of only the right lower limb, informs the participant about the passing time at the end of the first minute and 30 seconds before the time is up. The trial may be paused if the participant needs a rest, and be continued if two minutes have not passed.

The number of correctly performed leg elevations is the measure of this test.

The measurement was conducted before and after a series of exercises in water. Classes took place twice a week for four months. Exercise protocol: the program consisted 45-min sessions, 2 times a week for 16 weeks. Training was carried out on 2 different days, with a 1-day rest between sessions

Each training session included a 10-min warm-up and stretching time, 30-min endurance training, and 5-min relaxation period (slow walking and stretching). In order to evaluate data for the group of women, techniques of descriptive statistics were used. For statistic analysis a pairwise T Test was used. The results' analysis was presented both in tables and on charts. Statistic analysis was made with the use of Excel spreadsheet.

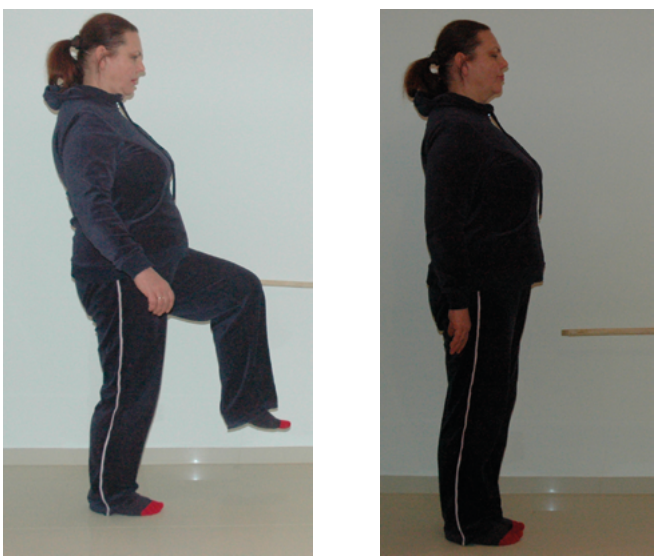

Figure 6. 2-Minute Step-in-Place

Table 1. Statistic parameters characterizing tested women's BMI and WHR index distribution.

Parameter / Tested	n	$\overline{x}$	s	V_x	Min	Q_1	Me	Q_3	Max	A_s
BMI	20	28.31	3.86	13.63%	23.79	24.99	27.75	29.74	36.61	0.95
WHR	20	0.83	0.06	7.23%	0.73	0.78	0.84	0.87	0.98	0.2

Table 2. Descriptive statistics for variables in the measurement 1 and 2

Parameter / Group	test	$\overline{x}$	s	V_x	Min	Q_1	Me	Q_3	Max	A_s
Chair Stand	I	14.45	2.72	18.82%	7	13.00	14	15.25	12	-0.5
	II	21.00	3.24	15.43%	20	19.00	21	23.00	26	-0.82
Arm Curl	I	16.80	3.64	21.67%	8	14.00	18.00	19.00	23	-0.46
	II	21.65	3.54	16.35%	10	20.75	21.50	24.00	27	-1.75
2-Min Step	I	103.10	18.26	17.71%	48	101.50	109.00	114.25	118	-2.13
	II	128.50	17.66	13.74%	69	129.50	133.50	136.25	144	-2.75
Chair Sit-and-Reach	I	1.35	8.23	609.63%	-25	0.00	3.00	6.00	9	-2.19
	II	3.75	8.20	218.67%	-20	1.50	5.50	9.25	15	-1.65
Back Scratch	I	-2.55	9.86	-386.67%	-26	-8.00	0.50	4.00	10	-0.86
	II	0.68	7.06	1038.24%	-13	-3.87	3.00	5.75	10	-0.36
8-Ft - Up-and-Go	I	6.98	1.72	24.64%	4.76	6.05	6.66	7.52	13.09	2.37
	II	6.35	1.72	27.09%	4.86	5.44	6.02	6.57	13.07	3.37

4. Results

The group of 20 women aged 60-75 took part in the survey. The group's mean age was 64 and the approximate age differentiation between the participants was 5.31 years. Body weight was between 60.5 and 91 kilograms, the group's mean body weight was 71.89 kg. The average differentiation of this quality between the participants was 9.19 kg (Table 1).

BEFORE TEST: The lowest BMI among participants was 23.79, average was 28.31 and the highest was 36,63%. The arithmetic average differentiation of particular measurements was 3.86. Variation coefficient was 13.63% which shows a small BMI differentiation in the group. On the basis of the asymmetry coefficient equal to 0.95, it can be assumed that the group was characterized by right sided asymmetry. BMI index was observed only 25% proper, 50% overweight, 15% class I obesity and 10% class II obesity.

AFTER THE TEST PERIOD OF EXERCISES: an improvement in index value "weight loss" was observed in almost all participants ($t = 5.80$, $p = 6.86 \cdot 10^{-6}$, $p < 0.05$).

BEFORE TEST: The lowest WHR index among participants was 0.73 and the highest was 0.98. Variation coefficient was 7,23 which shows a small WHR index differentiation in the analyzed group. 40% of the participants showed gynoidal obesity ('pear' type) and 60% androidal obesity ('apple' type) (Table 1).

AFTER THE TEST PERIOD OF EXERCISES: a slight decrease in waistline was observed in the majority of participants (55%), However, the decrease in index was statistically insignificant ($t = 0.85$, $p = 0.20$, $p < 0.05$). Over 70% of the participants showed a highly significant ($t = 4.86$, $p = 5.48 \cdot 10^{-5}$, $p < 0.05$) decrease in hip width. Moreover based on Fullerton Functional Fitness Test an improvement in functional efficiency of the participants was observed.

RESULT: the results obtained for each trial of the test are presented in table 2.

Before the test; the average number of standing-up cycles within 30 seconds was 14.45 and after test, that is before exercises in water began and after four months, it increased to 21 standing-ups. This improvement was observed in all tested persons. Thus, statistically highly significant increase in this index was observed ($t = -9.44$, $p = 6.60 \cdot 10^{-9}$, $p < 0.05$).

Results of Fullerton Test normal values; In measurement I, the majority of tested participants (80%) obtained a normal result, 15% obtained a very good and 5% had a poor result. After the test: the results of the trial improved significantly to 95% very good, 5% normal and 0% poor.

The average number of curls with the handle was 16.80 before the test and After the test period of exercises it increased to 21.65 curls in all participants (Table 2) moreover statistically, a highly significant increase in this index was observed ($t = -7.81$, $p = 1.19 \cdot 10^{-7}$, $p < 0.05$).

Results of Fullerton Test normal values; in measurements 50% of the participants obtained a very good result, 40% normal and 5% had a poor result. After the test, the results of the trial had improved in most participants, 90% obtained a very good result, 10% had normal and 0% had a poor result.

The average number of steps taken within a two-minute walk-in-place was 103.10 in measurement I and after the period of exercises it increased to 128.50 steps (Table 2) The improvement was noticed in all tested participants.

Moreover statistically highly significant increase in this index was observed ($t = 12.41$, $p = 1.47 \cdot 10^{-10}$, $p < 0.05$). Third trial Results of Fullerton Test normal values; In measurement I, most of the participant (65%) obtained normal values, 30% very good , and 5% had poor results. After the test, the results of the trial improved in most of the participants, 90% got a very good result, 5% normal values and 5% had poor result.

The average value in the discussed trial was 1.35cm in the first measurement and after the test exercises it increased to 3.75cm (Table II) a similar improvement was noticed in all tested participants. Moreover statistically a highly significant increase in this index was observed ($t = -4.71$, $p = 7.68 \cdot 10^{-5}$, $p < 0.05$).

In measurement I, the majority of tested participants (65%) obtained a poor result with Chair Sit-and-Reach, 30% normal values and 5% had a very poor result. After the test period of exercises, the results for the given trial improved in majority of tested participants, where 60% normal values, 35% poor result and 5% had a very poor result.

The average value in the Back Scratch - elasticity trial was -2.55cm in the first measurement and after the four-month test exercise it increased to 0.68cm (Table 2). A similar improvement was noticed in 80% of tested participants. Moreover statistically highly significant increase in this index was observed ($t = 4.07$, $p = 0.0003$, $p < 0.05$).

Values of the "Back Scratch" trial, based on the Fullerton Functional Fitness Test normal values: In measurement I, 45% of tested participants obtained normal values, 30% very good and 20% had poor result. After the test period of exercises in water, the results for the given trial had partially improved to 45% very good, 40% normal values and 15% poor result.

The average value of 8-Ft Up-and-Go trial was 6.98s in the first measurement and after the four-month-period of exercises it decreased to 6.35s (Table 2). The improvement was noticed in 95% of participants. Moreover a statistically highly significant increase in this index was observed ($t = 5.03$, $p = 3.74 \cdot 10^{-5}$, $p < 0.05$).

Results of the "8-Ft Up-and-Go" trial, in measurements I and II based on Fullerton Test normal values; In measurement I, 45% of tested participants obtained a very good, 45% poor and 10% had normal values. After the period of exercises in water the results for the given trial had improved to some extent, for 45% very good result, 15% normal values and 30% poor result.

Discussion

In Poland, as well as in all developed countries, the population aging process is being observed. Such a situation causes not only lots of unfavorable changes within country's socio-demographic structure but also severe difficulties of economic, medical, social and/or cultural type.

As a follow-up to physiological aging process, a gradual decrease in fitness and efficiency appears. The process is strictly connected with development of involution changes in central nervous system, impulses transfer disorders on a neuromuscular structures level (causing balance and motor coordination disorders), reduction in strength and muscle tissue elasticity, occurrence of articular system degeneration changes and reduction in bone mass density. Those changes cause significant motor organ overloading and, thus, lead to lowering of body functional efficiency [12,13].

When physical activity is done regularly and is adjusted to the age, health condition and personal preferences, it influences functioning of circulatory, respiratory and motor systems directly, and other tissues and organs indirectly. So far many researchers have proven positive influence of regular exercise on risks factors reduction, especially concerning circulatory and metabolic systems diseases, including dislipemia, hypertension, obesity, sclerosis, diabetes [14,15]. Nowadays, science provides more and more evidence that a healthy lifestyle, including regular physical activity, has a great importance in modern-age diseases prevention. Moreover, it allows to keep satisfactory fitness and body efficiency of the elderly, thus improving quality of their lives [16,17,18,19,20,21].

One of the latest forms of physical activity aimed at the elderly is gymnastics in water, also known as aqua aerobic. It is done in a swimming pool mostly and is usually accompanied by music chosen accurately. Exercises in water are usually quite dynamic, diversified and chosen suitably for participants. The load on the osteoarticular system is reduced due to being in water, hence this form of physical activity can be practiced by people with a really low fitness and with various motor system disorders. Water provides load reduction, brings relaxation to muscles and allows spine elongation, thus makes keeping the correct posture easier. While exercising in a swimming pool different sets of exercises are applied, including resistance, strengthening and flexibility exercises. Gymnastics in water strengthens muscles, positively influences cardiopulmonary system capacity parameters and also improves neuromuscular coordination [22,23].

The aim of the performed pilot studies was to determine if a larger study, using the chosen methods is feasible and the research question was: Have the 16-week of aqua gymnastics training had influence on functional fitness of women over 60. Rickli and Jones define functional fitness as "the ability to do activities of daily living (ADLs) safely and independently without undue fatigue" [24]. The results of traditional gym training of elderly people and their impact on physical function are well documented. However only a few studies have been published that specifically examine the changes in functional fitness of older adults in response to functional exercises [25].

The study was undertaken before and after a series of exercises in water. Classes took place twice a week for four months. The training was primarily aimed at devel-

oping general fitness and was a series of carefully chosen dynamic exercises accompanied by music. Six trials from the Fullerton Functional Fitness Test were chosen to evaluate functional fitness of participating women. After the four-month-period of exercising a statistically significant increase in functional fitness in all participating persons was observed. On the basis of the fitness trials done, improvement in the following motor features was noticed including: muscle strength, motional coordination, agility, balance, swiftness and endurance. The researches carried out prove extremely positive influence of aqua gymnastics on health and motor efficiency of the elderly. In the light of the observed demographic changes associated with ageing, obtained results are extremely important and promising.

The research performed is an innovative method. Only few authors have presented research data proving efficiency of exercise in water in health preventive treatment, improvement and maintaining functional fitness of the elderly so far. Piotrowska-Całka and Guszkowska have shown the influence of aqua aerobic on psychoemotinal condition of middle-aged women [26]. Gravelle et al. support thesis of positive influence of physical activity programme into which aqua-fitness is incorporated on fitness and the elderly better perception of their own fitness [27]. Gedl-Pieprzyca and Kisielewska point out positive influence of deep water jogging on capacity parameters improvement as well as posture correction in people of different age groups [28].

Sato et al. conducted a very interesting study that showed beneficial effects of the exercise in the water among patients over 65 years. The exercises were held twice a week for two years. The researchers found a significant effect of exercise in the water to maintain the efficiency of functional and independence in activities of daily living such as washing, bathing, using the toilet, climbing stairs, dressing, etc.

The authors emphasize that the impact of type of exercise in water and their intensity to maintain or improve activities of daily living has not been examined [29].

Sato et al compared the effects of once and twice weekly water exercise which were held for 6 months. The research has shown that exercises in the water increases muscle strength but does not affect the balance and muscle flexibility improvement [30].

Elbar et al have shown that the water-based training program in older adults has impact on balance improvement [31]. Ayana and Cancela have presented promising results of a pilot study which confirmed the positive effects of exercise in water to improve the functional efficiency of patients with Parkinson's disease [32].

The aquatic exercises may be an attractive alternative to the exercise at the gym. This thesis is supported by the research results of Meredith-Jones et al. [33].

In particular, that the movements in the water are smoother and safer especially for older people [34]. There is some evidence that exercise in water has an analgesic effect in rheumatic and degenerative diseases, although their long-term effectiveness is not clear [35]. In the view of the data obtained from the own research, a continuation of studies concerning exercises in water influence on functional fitness of the elderly is planned along with promoting this particular form of physical activity.

5. Limitation of the study

The small number of participants and lack of a control group were limitations of the study. However, this is a preliminary report. Despite of the limitations of the current research, the findings of the current research make valuable contributions to the field of research. The sample used in this study is small; however, the sample size was adequate to indicate general trends. Research will be continued on a larger group of women after 60 with regard to the control group.

6. Conclusions

In the group of women aged over 60, who have practicing in aqua aerobic for the period of four months, significant functional fitness improvement was observed.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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