

SUMMARY

THE EFFECT OF AQUA FITNESS CLASSES ON QUALITY OF LIFE, BODY COMPOSITION, AND PHYSICAL AND FUNCTIONAL FITNESS IN WOMEN IN EARLY OLD AGE

Aim. The aim of the dissertation was to experimentally evaluate the effects of a 12-week aqua fitness programme on quality of life, body composition, physical and functional fitness, and pelvic floor muscle performance in women aged 65–75 years. The study also examined whether women in early old age demonstrate a measurable adaptive response to regular exercise performed in an aquatic environment and assessed the practical applicability of aqua fitness as a safe and accessible form of activity supporting healthy ageing.

Material and methods. Two independent randomised controlled experimental studies with pre-intervention (PRE) and post-intervention (POST) measurements were conducted. Each cohort included 40 women randomly allocated to an experimental group (EXP; $n = 20$) or a control group (CON; $n = 20$), giving a total of 80 participants across both studies. Study 1 assessed quality of life, body composition, and physical and functional fitness, whereas Study 2 extended the protocol by evaluating pelvic floor muscle performance. Before enrolment, the participants did not engage in regular organised exercise and had no contraindications to moderate aquatic activity. The project was approved by the Bioethics Committee of the Regional Medical Chamber in Kraków.

Intervention. The experimental groups completed a 12-week aqua fitness programme consisting of two 65-minute sessions per week. Exercise intensity was moderate, corresponding to approximately 60% of maximal heart rate or 12–14 points on the rating of perceived exertion scale. Each session included an approximately 30-minute aquatic warm-up, a 30-minute main part, and a 5-minute cool-down. The programme combined aerobic, resistance, coordination, balance, breathing, mobility, and stretching exercises, with progression introduced every two weeks. It did not include exercises specifically targeting the pelvic floor muscles. The control groups maintained their usual lifestyle and did not participate in an organised exercise programme. No withdrawals or missing post-intervention data were recorded, and all women in the experimental groups attended at least 90% of the scheduled sessions.

Measurements and statistical analysis. Quality of life was assessed using the SF-36 and EQ-5D-5L questionnaires. Body composition was measured by bioelectrical impedance analysis with the TANITA DC-360 S analyser. Physical fitness was evaluated using the Fullerton Fitness Senior Test, while functional fitness and balance were assessed with the Balance Master/NeuroCom system. Pelvic floor muscle performance was measured using the PelviFly Boost system. The primary intervention effect was determined by comparing change scores ($\Delta = \text{POST} - \text{PRE}$) between EXP and CON. Independent-samples Student's t-tests were used

at $\alpha = 0.05$, and Cohen's d was calculated. With 20 participants per group, the sensitivity analysis indicated that the study was primarily capable of detecting large effects (approximately $d = 0.91$); therefore, non-significant findings were interpreted in conjunction with effect sizes and the limited statistical power.

Results. No significant between-group advantage was found for the experimental group in either the SF-36 scales or the EQ-5D-5L dimensions. More favourable absolute values observed in some EXP outcomes were already present at baseline and could not be attributed to the intervention. For body composition, significant between-group differences in change were found for body mass ($p = 0.036$; $d = -0.57$), total body water expressed in kilograms ($p = 0.009$; $d = 0.38$), and total body water percentage ($p < 0.001$; $d = 1.19$). No significant superiority of EXP was demonstrated for body fat percentage, fat mass, fat-free mass, muscle mass, bone mass, basal metabolic rate, or BMI, although moderate but non-significant effects were observed for fat mass and BMI. In the Fullerton Fitness Senior Test, a significant between-group difference was found only for the chair-stand test ($p = 0.032$; $d = 0.59$): performance improved in EXP and deteriorated in CON. Balance Master analyses identified between-group differences in 12 selected variables from the Walk Across, Forward Lunge, and Step Up/Over tests. Effect sizes ranged from small to very large, but the clinical direction of several variables was ambiguous. Given the large number of comparisons, the absence of multiplicity correction, and baseline differences, these findings should be considered exploratory rather than conclusive evidence of improved balance or reduced fall risk. The most consistent effect was observed in Study 2. Maximal voluntary contraction (MVC) of the pelvic floor muscles increased significantly more in EXP than in CON when expressed both in mV and mmHg ($p < 0.001$ and $d = 1.10$ for both measures). This finding supports an improvement in MVC but does not establish comprehensive enhancement of pelvic floor function, because endurance, rapid contractions, and relaxation outcomes were not reported.

Conclusions. The 12-week aqua fitness programme produced selective rather than global effects. The strongest and most reliable changes concerned pelvic floor muscle MVC and lower-limb functional strength measured by the chair-stand test. Differences were also observed in selected body-composition and functional-task variables, although these results require cautious interpretation. The intervention did not produce a clear improvement in overall quality of life, most body-composition indices, or the entire physical-fitness profile. Aqua fitness may be recommended as a safe, acceptable, multicomponent form of organised activity for women aged 65–75 years, particularly to support functional fitness and neuromuscular control. It should not replace specialist urogynaecological assessment or pelvic floor physiotherapy. When the primary goals are substantial gains in muscle mass, maximal strength, or bone health, aquatic exercise should be supplemented with progressive land-based resistance training and appropriate nutritional support. Future studies should use larger samples, longer interventions,

correction for multiple testing, and more comprehensive monitoring of training load, safety, adherence, and pelvic floor function.

Keywords: aqua fitness, older women, quality of life, body composition, functional fitness, pelvic floor muscles, healthy ageing.