

The effect of regular physical activity for the elderly over 60 years of age to retain independence for women: a randomized controlled trial

Thesis booklet

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Introduction

The structure of our society is changing, causing remarkable social and sociological age related problems all over the world. As such, the 21th century has been labelled as “the century of age-related people”, because older adults representing the fastest growing segment of the population.

Advancing age is associated with predictable sensory, motor and cognitive changes, many of which can potentially impact an older person’s ability to effectively function in society. These age-related physiological changes – reductions in muscle mass, muscle strength, flexibility, vital capacity, bone mineral density, etc. – affect a broad range of body tissues, organ systems and functions, which cumulatively can affect activities of daily living and upholding the physical independence of older adults.

Regular physical activity is important to prevent illnesses and rehabilitation purposes because they have significant impact on fitness status; antropometric data; quality of life or physical and mental health of the elderly.

The purpose of this study was to assess whether two different half-year-long regular training programmes had a positive effect on health dimensions, bone mineral density, and fitness status in population of women over 60 years.

Literature review

Regular physical activity has been proved to prevent several cardiovascular and musculoskeletal illnesses, which are amongst the most common disorders in older population in large part of the world (Apor, 2011; Székács, 2005).

Research proves that regular PA is important in the prevention and management of pathological conditions (Bilotta et.al, 2011; White, Wójcicki and McAuley, 2009). Regular and developmentally appropriate physical activity prevents functional decline, heart disease, diabetes, bone fracture, falling, and it also improves sleep and quality of life in older adults (Maduera et.al, 2007; Protas, and Tissier, 2009).

Individuals with certain medical conditions or disorders are highly recommended to be engaged in proper and complex regular physical activities. Participation in a PA exercise

program is proved to improve the functional performance of functionally-impaired older people (Barnett et.al, 2003). About every third woman in the postmenopausal age-range is not involved in physical activity and the prevalence of inactivity progressively increases with age (Church et.al, 2009). This may in part explain the observation that fitness levels decline 1% to 2% per year during the critical postmenopausal years. As a result of several factors, including a lower level of estrogen, postmenopausal women are at increased risk for a number of health conditions, such as osteoporosis and heart disease.

Osteoporosis is one of those musculoskeletal disorders that give a lot of older women barrier in their mobility and so their daily lives are substantially effected (Bálint, 2006). Osteoporosis produces reduced bone mass and microstructural deterioration of bone tissue, which increases the risk of trauma fractures (Szekeress, 2005). The most common clinical complications of osteoporosis are hip, wrist, and vertebral fractures, which are associated with a high degree of morbidity and mortality, resulting in reduction in the daily routines of activities of daily living.

Several different PA program - for example power, endurance and flexibility training - were compared by Chodzko-Zajko et al in 2009. Most of training had positive effect on endurance, lower body strength, dynamic balance or flexibility of elderly, but it was not proved which program was found to be more effective. Physical activity is known to have a meaningful impact on several aspects quality of life (Leś and Gaworska, 2011), it can improve all-around fitness and the health status of individuals over sixty years of age. Regular PA has also has a significant positive effect on physical and mental health, and also on depression (Nelson et.al, 2004; Parker, Strath and Swartz, 2008).

Purpose

The main purpose of the study was to assess the fitness status, anthropometric data, quality of life, physical and mental health status and bone mineral density of women over 60 years of age from Turkish and Medical Centre in Eger. It was also compared, which half-year long intervention program were more effective.

Hypothesis

H₁: The regular fitness program and mental intervention have a positive effect on fitness status – muscle strength, flexibility, dynamic balance or aerob capacity-.

H₂: The intervention program have positive effect on antropometric data – weight, high, body mass index, fat free mass, fat percent and visceral fat mass – of elderly women.

H₃: The quality of life – Sensory Abilities, Social Perception, Sociabilty, Past-Present-Future Abilities, Death and dying, Intimacy - of participants will show a positive result at the end of the program.

H₄: The general health, as well also the physical and mental health status or Beck Depression Inventory will have been effectively improved.

H₅: The bone mineral density of proximal epiphysis femur and lumbar spine will have a positive result at the end of the program.

H₆: It is assumed that there are significant differences between the intervention programs between pre- and post examinations.

Material and Methods

The sample was chosen from inactive female patients attended at the Turkish Spa and Rheumatology Centre of Eger city between 1st of January 2011 and 30th of March 2011.

The participants were randomly assigned into three groups:

- Training group: N = 14; $M_{\text{year}} = 64.8 \pm 3, 54\text{SD}$
- Training and Mental group: N = 16; $M_{\text{year}} = 67,65 \pm 6, 27\text{SD}$
- Control group: N = 15; $M_{\text{year}} = 46\text{SD } 63,73 \pm 4,$

Methods of measurement

General questionnaire

The demographic data were measured:

- Age
- Place of birth

- Level of education
- Marital status
- Monthly income
- Lifestyle-nutrition, addictions, etc.
- At the end of the intervention, the following questions were asked:
- Changes in lifestyle habits
- Medications
- Subjective health status

Fitness Test

The Fullerton Functional Fitness Test, California that has been validated for Functional Fitness test (FFFT), also known as the Senior Fitness test was based on (Rikli and Jones, 1999):

- Chair Stand Test for assessing lower body strength: stand up and sit down onto a chair (thirty seconds, No.).
- Arm Curl Test for assessing upper body strength: curling and extending the arm with 2 kg dumbbells in participants' hand (thirty seconds, No.).
- Back Scratch Test for assessing upper body (shoulder) flexibility: measure the distance between middle digits (+, - cm).
- Chair Sit'n Reach Test for assessing lower body (primarily hamstring) flexibility: to measure the distance between big toe and tip of middle digits (+, - cm).
- 8-Foot Up'n Go Test for assessing physical mobility; involves power, speed, agility, and dynamic balance: time was measured from standing up from a chair, coming around a buoy and to sitting down (s).
- 6-minute Walk Test for assessing aerobic endurance: walking distance was measured (six minutes, m).

Body composition test

This test was analysed by Inbody 720

- Height - TTM (cm)
- Weight - TTS (kg)
- Body mass index - BMI (g/m^2)
- Body fat - F% (%)
- Visceral fat mass - VFA (m^2)
- Fat free mass - FFM (g)

Quality of life

Quality of life was measured with WHOQOL-OLD test questionnaire (Tróznai and Kullmann, 2007).

- Sensory Abilities
- Social Perception
- Autonomy
- Past-Present-Future Activities
- Death and dying
- Intimacy

Physical and mental health status

The physical and the mental health dimensions of the participants were assessed with the validated Hungarian version of Medical Outcome Study Short Form Questionnaire (SF-36)

- Physical Functioning (PF)
- Role Physical (RP)
- Body Pain (BP)

- General Health (GH)
- Vitality (V)
- Social Functioning (SF)
- Role-Emotional (RE)
- Mental Health (MH).

Bone mineral density measurement

Density of X-Ray Absorptimetry DXA, Hologic by BMD, T-score and Z-score:

- Femoral neck
- Trochanter major
- Crista intertrochanterica
- Total Hip
- Ward's triangle
- L₁₋₄ vertebrae
- Total L-spine

Determination of the degree of depression

Beck Depression Inventory was measured by the test of Beck et al. (1961).

Data Processing

Data were analysed with SPSS 18.0 for windows:

- Kruskal-Wallis Non-Parametric test
- Descriptive Statistics (Descriptives, Frequency)
- Paired Samples T-test
- Repeated Measures Analysis of Variance (RMANOVA). The between groups comparison were assessed by LSD post-hoc test.

Intervention

- Training group (T): participants took part two power training sessions and one endurance training session three times a week; each lasted sixty minutes. Every session was managed and conducted by a physiotherapist and a physical activity expert. Power and endurance programs were combined with flexibility, balance, and agility exercises.
- Mental group (M): participants took part in one power training session and one endurance training session a week and also had an informative presentation/discussion session about healthy lifestyle once a week.
- Control group (C): participants did not take part in any of the intervention programs. Their lifestyles, mainly physical activity and nutrition, did not change throughout the program.

Results

Due to the half-year PA program, both intervention groups improved significantly as indicated in the pre – and post-test measures. The impact of the intervention can be considered even more meaningful because the control group declined in a number of test items by the end of the program.

According to Pair Samples T-test and Repeated Measures ANOVA, both the “T” and “M” groups improved significantly in their overall fitness status, health dimensions and bone mineral density.

In our study, it was observed that physical and mental health, bone mineral density, and fitness status could all be improved over a six-month period of regular physical activity in a sample of postmenopausal women with osteopenia and osteoporosis. There were significant improvements in the intervention groups, and the control group showed decline over the six-month period. Osteoporosis and functional and mental declines were significantly reduced by power or agility exercises and a healthy lifestyle in the population of older women.

The physical exercise program was found to be important means for older adults; the high attendance rate supports the suitability of such an exercise program for a long period of time. According to participant feedback, training exercises were found to be very useful for their activities of daily living, and the pleasant interaction with the instructors kept them interested and motivated throughout the half-year study.

Summary

Physical activity for the elderly is important in preventing several cardiovascular and musculoskeletal illnesses. Regular physical activity has an impact on several physical and mental health dimensions, which was proved in our study on women over 60 years. The purpose of this study was to assess the effects of two different half-year-long regular intervention programs for rheumatology patients from Turkish Spa and Rheumatology Center from Eger. The strength and duration training combined with balance, flexibility or relax gymnastic were developed three times per week for the “Training group”. Mental discussions were moderated by recreational specialists. These topics -training programs, healthy living, nutrition, recreation abilities - are important for prevent health status and activity of daily living for retired women.

National and Hungarian validated tests were used: Fullerton Functional Fitness Test, Inbody-720 for antropometric details, SF-36 for physical and mental health status, WHO Quality of Life-OLD questionnaire, Beck-Depression Inventory and bone mineral density (DXA). Data were analysed by SPSS 17.0 for windows with descriptive statistic, Paired Samples –T-Test and Repeated Measures ANOVA.

It was proved, that “Training group” or “Training and Mental group” had significant improvements in most of results between pre- and post measurements. Six test, and 58 subscale were measured with RMANOVA: Within Subject’s Effect – Variable*Time*Group: $F=4,192$; $p=,000$) Between Subject Effect ($F=4598,758$; $p=,000$). The LSD post-hoc test made the following results: T * K group ($p=,006$); TM * K group ($p=,019$).

It was observed that physical and mental health, bone mineral density, antropometric details, quality of life and fitness status can all be improved over a six-month-

long period of regular physical activity in a sample of elderly rheumatological women. There were significant improvements in the intervention groups, and the control group showed decline in a few measures. Therefore, osteoporosis, functional and mental declines were reduced by power or agility exercises and a healthy lifestyle in the population of elderly women.

Register of own publications

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