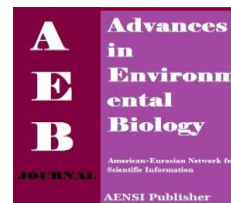




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The Effects of selective aerobic program on well-being and quality of life in elderly men and women

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ABSTRACT

Background: We investigated the effect of selective aerobic program on well-being and quality of life (QoL) in older men and women. Materials and Methods: Participating in the study were sixty elderly men and women aged 70 and older. The selective aerobic program was administered to the individuals for 16 weeks (3 times a week) at the rehabilitation unit. Outcome measures included a short form-36 (SF-36) and well-being questionnaires. The mean ages of patients were 66.8 ± 5.8 years. Results and Discussions: The scores of the SF-36 scores for the participants after completion of the selective aerobic program were observed statistically significant improvement. After completion of the selective aerobic program, no statistically significant changes were determined with the well-being domains evaluation ($p < 0.05$). Conclusion: Using selective aerobic program resulted improvement in the scores of QoL and wellbeing domains. We have shown that this selective aerobic program is effective and suitable for older people.

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INTRODUCTION

Previous studies have mostly found that physical activity is associated with improved psychological well-being, life satisfaction, cognitive functioning, and decreased psychiatric symptoms, especially depression and anxiety, in various populations [33,11]. High quality of life means that individuals feel better, function better on a daily basis, and for most, live independently [14]. As the proportion of older adults in the population continues to grow, there is a great need to establish ways of delaying or preventing morbidity in later life and maintaining QoL [20]. The goals of exercise and physical activity are different for young and old adults. For younger adults, exercise is recommended to prevent cardiovascular disease, cancer, and diabetes, and to increase life expectancy. But it is hoped that exercise and physical activity for the oldest adults can combat the frailty and vulnerability that are caused by inactivity, minimize the biological changes of aging, reverse disuse syndromes, control chronic diseases, maximize psychological health, increase mobility and function, and assist with rehabilitation from acute and chronic illnesses [27]. Overall, approximately 18% of persons at or over the age of 60 years are dependent in one or more activities of daily living (ADL), [24]. And, as the age increases, so too does the dependency on others in performing ADL, therefore affecting the QoL and wellbeing [24,18,20,22,24]. Exercise has been shown to affect favorably a variety of variables in older adults [18,31].

Thus, older adults have been targeted as a sector of the population in need of specific encouragement to engage in physical activity and exercise [23,12,15]. The mode of exercise must be acceptable to the target population, i.e., the participants should find an enjoyable activity, in which the subjects are able to participate regularly [21,19]. Although frequency, duration, and modality can be directly observed and quantified, assessing exercise intensity is problematic in very old adults [23,33]. High intensities of a dose-response range are associated with health risks and sometimes pain [30]. And many physical characteristics other than aerobic capacity, such as denture problems, muscle cramps, loss of tissue pulp in the fingers and soles of the feet, or peripheral neuropathies may preclude accurate measurement of the fitness or strength of older adults. Therefore it may also be necessary to show that exercise prescription is effective in improving fitness levels [23,4]. Still however, there is no consensus on the appropriate quantity, quality, or intensity of exercise that is necessary to promote better health, well-being and function in this population [36,17].

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Although it has been stated that different aerobic programs are effective at improving both muscle strength and functional capacity, it is not clear which aerobic program would be the most effective in increasing the well-being and QoL. The purpose of this paper was to determine whether a selective aerobic program could significantly improve QoL and well-being domains in older people.

MATERIALS AND METHODS

Sixty healthy adults over the age of 60 years, 32 male and 28 female (mean 66.8 ± 5.8 years) volunteered to participate in this study, of the original sample, (sixty patients), 3 had to be excluded because of severe physical illness, of remaining, them agreed to a following investigation. Screening evaluations included a medical history, physical examination, blood pressure, routine blood and urine tests, heart rate and the electrocardiogram (ECG) and biographic data.

All subjects were physically active and able to perform ADL independently, but none had any experience regular exercise training. Exclusion criteria were: neurological impairment (disability, stroke, Parkinson's disease, paresis, plagia), severe cardiovascular disease (acute myocardial infarction, congestive heart failure, and uncontrolled hypertension), unstable chronic or terminal illness (diabetes mellitus, malignancies), major depression, severe cognitive impairment, or severe musculoskeletal impairment (inability to participate in the training regimen) and acute respiratory disease. Each volunteer gave his/her written consent to participate in this study and this study was approved by local ethics committee.

Short form 36 (SF-36):

SF-36 questionnaire was used in order to evaluate the quality of life. It is essential that the scores should be obtained for the designated life areas, such as physical functioning, physical role, pain, general health, vitality, social functioning, emotional role, and mental health [26].

Well-being:

Each participant in this study completed a questionnaire battery consist in of seven scales of social, psychological and physical well-being, and questions relating to socio-demographic background. In brief, the questionnaire yielded information relating to the following: The first two scales described were developed specially for use in studies of quality of life and elderly. (1) A 20- item semantic differential rating scale measuring self esteem. This scale has a Cronbach's Alpha of 0.78 ($n=1004$), thus confirming its internal consistency. (2) A 20- item measure of life fulfillment with items covering the following areas family and social relationships, leisure, worries, material security, work. Fulfillment was operationalized as the discrepancy between actual and desired circumstances and is similar to the method developed by Krupinski in Australia. The scale's reliability was deemed acceptable based on a Cronbach's alpha of 0.76 ($n = 1030$). (3) Reported social and interpersonal difficulties-a 30-item scale in which subjects rate the degree of difficulty experienced in situations varying in the type and depth of social contact required. (4) A 14- item general physical health checklist. (5) An 11-item worries rating scale. Measuring the degree of worrying about various aspects of life. (6) A 10-item checklist identifying the occurrence of various positive and negative emotions. The checklist results in two measures of emotional well-being-positive and negative- affect reflecting the occurrence of positive and negative mood states respectively [29].

Aerobic program intervention:

The selective aerobic program was 16-weeks, designed to improve physical and muscle strength. The subjects were asked to attend a group- foundation aerobic program of about 1hduration. Aerobic exercises were performed on 3 days per week at the rehabilitation unit, under a senior physiotherapist's supervision. The subjects were required to walk for approximately half an hour at least 2 days a week for the duration of the trial. The sessions were divided into the following five sections: a warm-up period, muscular strength, balance, a flexibility component, and a cool-down period. Warm-up training in the form of a 10-min walk was always performed before the primary aerobic exercise session. This was followed by 40 min of muscular strength, balance and flexibility exercises, and finished with 10 min of cool-down activities. The exercise aerobic included movements of flexion, extension, lateral flexion, and rotation of the cervical and lumbar spine, as well as extension, flexion, abduction, adduction, and rotation of both the upper and lower extremities at the beginning of the session. Free weights were used for resistance exercises, in the form of hand-held dumbbells and ankle cuff weights available in 0.5–1 kg increments.

For each muscle group, participants were instructed to perform up to 2 sets of 10 repetitions each through full range of motion. Resistance exercises were performed using the following techniques: overhead press, lateral shoulder raise, overhead triceps, single row, upright row, biceps curl, hip extension, hip abduction, calf raise, squat, sit-to-stand, hamstring curl, and ankle flexion–extension. The balance exercises were done by means of a simple balance board and mini-trampoline. In addition, balance exercises also included movements

that tandem walking, forward–backward stepping, weight transfers from one leg to the other, the toe press (raising up and down on the toes as far as possible), the heel lift (toes off the floor), and standing on one leg. Flexibility exercises were primarily stretching of the major muscle groups (biceps, triceps, rhomboid, trapezius, hamstrings, quadriceps, hip flexors, calf, gluteus, and the hip adductors).

For each of the aerobic program, participants were provided with simple, step-by-step written instructions with illustrations. To monitor adherence to the program, participants were asked to complete a daily aerobic program calendar, which was then reviewed by the physiotherapist during each visit.

Data was analyzed by the Statistical Package for Social Sciences (SPSS) version 13.00 software system for Windows. To evaluate socio-demographic characteristics, descriptive statistical methods were used. In comparisons between different groups, the paired “t” test was used. For statistical methods we preferred using nonparametric tests. Values of $p < 0.05$ were considered as statistically significant.

RESULTS AND DISCUSSION

In this study 32 men and 28 women participated, no significant difference could be found between men and women, although women more functionally impaired in the Activity of Daily living (ADL) scales. The mean age of the participants in the study group was 66.8 ± 5.8 years.

Table 1: Well-being domains (subjective and internal states) and SF-36 scores (mean \pm S.D)

N = 60	Pre-training	Post-training	p-value
Self esteem	39.12 \pm 23.43	64.23 \pm 24.89	*
Life fulfillment	53.00 \pm 21.45	69.84 \pm 19.34	*
Social difficulty	54.11 \pm 13.12	49.10 \pm 13.23	*
Physical symptoms	76.1 5 \pm 12.87	48.50 \pm 21.12	*
Worries	50.11 \pm 21.35	29.00 \pm 14.39	*
Positive affect	45.10 \pm 21.17	62.21 \pm 19.16	*
Negative affect	41.24 \pm 12.76	19.00 \pm 21.46	*
SF-36			
Physical functioning	52.12 \pm 16.34	62.50 \pm 15.28	*
Social functioning	93.00 \pm 13.47	97.14 \pm 12.18	*
Pain	44.15 \pm 16.12	71.10 \pm 13.41	*
General health	41.50 \pm 16.44	65.1 5 \pm 14.73	*
Vitality	31.70 \pm 14.39	54.50 \pm 20.13	*
Role-physical	39.75 \pm 26.12	75.25 \pm 17.55	*
Role-emotional	47.1 0 \pm 12.95	65.80 \pm 23.13	*
Mental health	44.15 \pm 20.12	73.95 \pm 19.24	*

* $P < 0.05$.

Among the participants, 26% were widows, 37% were single and 37% were married, and the level of education attained among the participants was: 54/3% completed the elementary school level, 24.4% completed middle and 11.3 high school, and 10% completed university. Of the participants, 51.7 % had a history of geriatric falls but during the exercise period no falls by any of the participants were observed.

The scores of the SF-36 scores for the participants after completion of the selective aerobic program were observed statistically significant improvement (Table 1) ($p < 0.05$). After completion of the selective aerobic program, no statistically significant changes were determined with the well-being domains evaluation (Table 1) ($p < 0.05$).

Conclusion:

The majority of elderly studies investigating, this area, have primarily focused on the relationship between single-based exercise and only QoL [18,24], furthermore, we were unable to find any single study that had simultaneously evaluated the effect of selective aerobic program on well-being and QoL, together, in elderly people.

We found that a combined, intermediate intensity, selective aerobic program that was performed regularly by older people led to improvements on well-being domains and raised their scores on the QoL assessment.

Aerobic program were specifically designed to remediate deficiencies in strength, ability to balance, speed of reaction time, and coordination [1,10,13]. In particular, the effects of low intensity, combined aerobic exercises on functional performance, falling and balance were all evaluated, with different results reported [20,35,8,25,5,16,28].

It has been pointed out that aerobic exercises of moderate intensity which are performed daily for 20–30min are very helpful in preventing functional limitations [16,8]. It has also been reported that high intensity programs are ineffective at preventing falling, and they increase the risk of injury [8,25,37].

Capodaglio et al found that a combined aerobic exercise program provides improvements in muscle strength and results in greater functional performance, thereby increasing well-being and QoL [7]. Brown et al

evaluated the effects of both a supervised and unsupervised, low intensity, flexibility aerobic exercise program of 3-month duration on physical performance, balance, strength, and coordination. No significant difference was found for any of the variables between the two groups, with the exception of range of motion and flexibility [6]. Although many studies evaluating the effects of aerobic exercise on older people have been conducted, there is still no agreement on which program, and of what intensity and duration, would be the most effective at improving the QoL and well-being. This can partly be explained by the fact that when various Meta analyses in the literature were reviewed, it was found that the effects of aerobic exercise on well-being, QoL, physical performance and muscle strength were found to be different. This is one of the problems facing a doctor who is trying to prepare an aerobic exercise program for a patient [32,37,5,28].

In our study, which employed a selective aerobic program of intermediate intensity, we found significant improvement on the well-being domains and increases the scores of the SF-36. Although there are some studies evaluating the effects of exercise on the score for QoL on the SF-36 in the older age groups [9,29,23], there are only a few studies that have sought to evaluate the effects of aerobic exercise on the QoL in healthy older people [2,3,13].

Increasing the QoL, however, is one of the primary goals for health improvement in older persons. There is little doubt that improvements in both physical performance and muscle strength would increase the ability of older individuals to carry out their daily life activities. Therefore, it makes sense that these improvements would also increase the well-being and QoL. It is, of course, imperative first to demonstrate this relationship in studies. Despite the fact that no significant improvement was found after resistive and flexibility aerobic exercises in a study by Barrett and Smerdely [3], improvements in all the scores of the SF-36 were observed with the selective aerobic program in our study. It is known that the level of physical activity of an individual will have an effect on their QoL, thereby increasing their sense of well-being [34].

There were some limitations in our study; however, first of all, the results would be more conclusive had the study group been larger. Unfortunately, it was difficult to convince the would-be participants to visit the rehabilitation unit three times a week. Weather conditions, difficulty of finding transportation and personal reasons were all factors, which played a role in limiting participation. Participants who completed the study were all consistent with their involvement. Falling, an important potential health problem in this age group was not included in the evaluation due to time limitations. Also, participants who were active and had a high physical capacity might also be thought as a restrictive factor. It very well may be useful to suggest this aerobic exercise program to older people in order to increase their well-being domains and scores of QoL. There is a need for additional studies evaluating the effects of selective aerobic program similar to that used in this study on the frequency of falling among the geriatric group, and work out the costs and benefits. Additionally, it will be helpful to compare the aerobic exercise programs performed by the home aerobic exercise group and the supervised group in the rehabilitation unit among the geriatric population and to determine the effect of this selective aerobic program on wellbeing and QoL, and finally, to be able to prepare useful aerobic exercise guides for the geriatric population.

In conclusion, performance of this selective aerobic program to older people resulted in improved scores measuring the QoL and well-being domains. We believe that this selective aerobic program is both effective and reliable for this age group of people.

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