

Effectiveness of aerobic exercise on dimensions of quality of life in elderly females

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Abstract

Context: Given increasing number of older adults and the burden of care costs of them, improving the quality of life (QOL) of these people is one of the main targets of researchers in this field.

Aims: This study aimed to investigate the effectiveness of aerobic exercise on the dimensions of QOL among elderly females.

Setting and Design: This semi experimental research with re-post test design conducted in Rehabilitation and Daily Care Center of Iran-Tabriz 2018.

Materials and Methods: Sixty elderly females were selected based on criteria and divided via blocks randomization into intervention ($N = 30$) and control groups ($N = 30$). The intervention group participated in aerobic training for 8 weeks (24 sessions). Both groups were evaluated before and after intervention with QOL questionnaire (SF36).

Statistical Analysis Used: Data were analyzed using SPSS-20 software through descriptive, Chi-Square, one-way, and multivariate covariance methods.

Results: The QOL of majority of elderly women was low (78%). The mean score of QOL in the intervention group before intervention was 43.99 ± 4.4 and after intervention was 55.46 ± 4.62 ($P = 0.001$). In the control group, the mean score of QOL was 44.70 ± 4.51 before and 47.31 ± 4.37 after intervention ($P = 0.41$).

Conclusion: Aerobic exercises have improved the QOL in all mental and physical aspects of women aged 60–70 years. Therefore, this easy and cost-effective intervention is beneficial for aged woman to promote QOL dimensions. It can be used as intervention to enhance QOL of aged peopled.

Keywords: Aerobic exercise, Aerobics, Elderly, Quality of life, SF36

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INTRODUCTION

Elderly people (aged 65 years and older) made up 7.7% of the global population in 2013, and it is estimated that this will have increased to 10.2% by 2023, 20.8% by 2050, and 27.7% by

2075.^[1] In this way, world populations will be included a large group of elderly with a smaller different age groups.^[2] The results of Iranian national statistic in 2016 indicated that the population over 65 years was about 6.1%, which is steadily increasing, and is estimated to reach 25 million in the next 12 years.^[3]

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The effects of aging appear in the form of reduced ability, increased dependence, and increased need for health care services.^[4] Hence, 60% of the health care costs, about 35% of the hospital discharge, and 47% of hospital admission days are accounted for patients above 60.^[5] In addition to physiological constraints, potential financial problems, compulsory retirement, less activity, etc., simultaneously increase the vulnerability of this age group to psychological disorders.^[2] The set of personal, social, and economic problems affects the quality of life (QOL) in this age.^[6] The World Health Organization defined QOL as the perception and reception of individuals from their situations of life, considering the cultural background and value system in which they live and defines their goals, expectations, standards, and interactions.^[7] Several studies have reported poor QOL of elderly and believed that there is a need for appropriate interventions in this regard.^[8-10] Different researches showed physical activity is a significant factor in physical and mental health (MH) condition.^[11] Meanwhile, researchers and sports professionals believe that exercise can play an important role in improving the QOL of different age groups.^[12] There is different set of physical activity intervention, which among aerobic exercises attracted attention of health professionals, as it is easy and multieffective.^[13]

Aerobic exercise is an effective activity, which prevents depression because the practitioner follows this exercise in a grouped manner in the form of predetermined and balanced muscular movements; it is also very effective in strengthening group behaviors.^[6] Increasing the level of physical activity in the elderly can increase the blood flow to the brain and increase the amount of available oxygen in nerve cells.^[5] This training has positive effect on cognitive and physical impairment.^[14] According to the researches, QOL of elderly females improved with high physical activity.^[14,15] Physical exercises have a significant relationship with the improvement of psychological, cognitive, and physical condition of the elderly.^[16] However, another study showed no significant change in QOL after 6 months of aerobic training in male elderly.^[17]

A review of studies suggests that physical activity and exercise can affect the various dimensions of elderly life, but there are still gaps in previous studies. First, there are some inconsistent results and mostly conducted in males. Another issue in previous research is that the study of the effectiveness of physical activity on all aspects of the QOL has been neglected. Therefore, this study aimed to evaluate the effect of aerobic exercise on elderly females QOL components.

MATERIALS AND METHODS

This study carried out in a semi experimental research with re-post test design during March–July 2018. The proposal of study approved in the Scientific Committee of Illam University of Medical Sciences with Ethical Cod: IR.MEDILAM.REC1397.080. All participants were informed about the study procedure and signed written consent form. Further, they also informed that they could withdraw from the study at any point of the study period, and there is no need to write down their name in questionnaires. Participants were assured that the data from the questionnaire would remain confidential.

The statistical population of this study consisted of 60–70-year-old women who referred to the Iran elderly care home of Tabriz during March–July 2018. Based on similar study,^[18] error type I (0.05) and the second type error (0/20) according to the following formula, considering about 20% drop, approximately 30 people were determined for each group:

$$N = (\sigma_1^2 + \sigma_2^2)(z_{1-\alpha/2} + z_{1-\beta})^2 / (x_1 - x_2)^2$$

$$N = (31.5)^2 (0.84 + 1.96)^2 / (16.99)^2 = 25$$

$$\sigma_1^2 = 14.3$$

$$\sigma_2^2 = 17.2$$

$$x_1 = 66.3$$

$$x_2 = 83.2$$

Multistage sampling administered at first, a daily elderly care center randomly selected among list of elderly nursing homes of Tabriz (Iran's Elderly Daily Center) and 60 subjects selected based on the inclusion and exclusion criteria in this center. Participants through permuted block randomization assigned to two intervention groups (30 people) and control (30 people).

Inclusion criteria included no participating in other study in the same time; educated; having an adequate level of physical and mental fitness to participate in aerobic exercise activities that confirmed by a physician and mentor; willing to participate, availability for the next 2 months, acquiring an average score in the physical activity questionnaire. Exclusion criteria included having physical and psychological illnesses and the need for medical interventions during research, failure to complete the sessions, communication problems such as difficulty in speaking or hearing.

The data collection tools were included demographic characteristics questionnaire (age, occupation, income, number of children, education, chronic disease, duration of illness, consumable drugs) and physical activity questionnaire for initial evaluation of participants and QOL (SF36) questionnaire.

QOL measured by SF36 which measures eight scales: physical functioning (PF), physical role (PR), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), emotional role (ER), and MH. Component analyses showed that there were two distinct concepts measured by the SF-36: A physical dimension, represented by the physical component summary, and a mental dimension, represented by the mental component summary.^[19]

The scores ranged between 0 and 100. High scores signify better health status. The total QOL score also obtained from the scores of subscales divided by eight. The score below 50 defined as low QOL, between 50 and 75 as average, and over 75 as high. The validity and reliability of this questionnaire approved in the Iranian population. The questionnaire was translated and validated by Rafati *et al.* Cronbach's alpha of questionnaire was between 0.77 and 0.90.^[20] The internal consistency coefficients of the eight subscales were reported between 0.70 and 0.85 and their retest coefficients with a week interval of 0.43 and 0.79.^[21] Kargarfard *et al.* reported Cronbach's alpha of 0.84.^[22]

Physical activity questionnaire

This scale was developed by Topolski *et al.* (2006). This scale consists of seven simple questions that measure the physical activity of elderly over the past week. Physical activity in this questionnaire categorized into five levels: no activity, low activity, almost low activity, moderate regular activity, and appropriate activity. In the study of Topolski *et al.* (2006), the correlation of the questionnaire with other questionnaires was acceptable, and the Cronbach's alpha was equal to 0.85. The questionnaire translated into Persian by Ishaghi *et al.* and content validity confirmed. Test reliability was 0.73 with a 1-week interval. Reliability between evaluators showed a correlation between 0.44 and 0.87. The Cronbach's alpha was 0.79–0.85.^[23]

In the intervention group, aerobic exercise was practiced in 24 sessions for 8 weeks, three times a week (40 min each session) in two groups ($n = 15$). Both groups evaluated in the same conditions before and after intervention using standard QOL questionnaire (SF36).

Each training session consisted of 10 min of warming up and stretching along with 30 min of exercise, which

was performed by an appropriate method. The exercises consisted of moving, harmonized, and timed movements at a specified time and continuously along with a song. The control group does not receive any intervention during the program. Given ethical considerations after posttest in the control group, the participants received aerobic training movies and songs to exercise in sport room of rehabilitation center.

To describe variables frequency, mean and standard deviation were used. In the analytical section, normality of data's distribution tested through Kolmogorov–Smirnov normality and Chi-square test was used to examine the homogeneity of groups, and multivariate analysis of covariance analysis was used to investigate the effect of intervention. The analytical steps and the results were performed using SPSS 20 software (IBM, Armonk, NY, United States of America). The statistical significance level in this study was <0.05 .

RESULTS

Findings showed that of 30 people in each group, 27 cases remind in the intervention group and 29 in the control group ($<10\%$ drop). Of four omitted cases, two does not complete exercise sessions and one infected with acute influenza in the intervention group. In the control group, one case removed because of invalid questionnaire. The majority were educated below diploma (58%), only 9.5% of university education, and the rest of primary education. The largest number of participants (63%) earned less than one million Toman monthly; 20% reported income between 500,000 and 1 million, and only 2% had over two million monthly income. The majority had at least one chronic illness (76%). The age range of the participants was between 60 and 70 years and the mean age was equal to 63.91 ± 2.93 . The majority of participants (76.2%) reported QOL score <50 and 23.8% scores ranged between 50 and 75.

Baseline comparison indicated that two groups of control (29 people) and intervention (27 people) were homogenous in terms of age ($\chi^2 = 0.91$, $P = 0.460$), education level ($\chi^2 = 1.68$, $P = 0.43$), income ($\chi^2 = 3.26$, $P = 0.13$), and health status ($\chi^2 = 0.64$, $P = 0.31$) [Table 1].

The QOL of majority of elderly women was low (73%). The mean score of QOL in intervention group before intervention was 43.99 ± 4.4 and after intervention was 55.46 ± 4.62 ($P = 0.001$). In the control group, the mean score of QOL was 44.70 ± 4.51 before and 47.31 ± 4.37 after intervention ($P = 0.41$). The results revealed that groups in the postintervention stage in case of PF, PR,

Table 1: Comparison of demographic characteristics among aerobic exercise and control groups

| Variable | Intervention, n (%) | Control, n (%) | P, χ^2 |
|--------------------------|---------------------|----------------|-------------|
| Education | | | |
| Elementary | 3 (11.1) | 1 (3.4) | 1.68, 0.43 |
| High school | 22 (81.5) | 24 (82.8) | |
| Academic | 2 (7.4) | 4 (13.8) | |
| Chronic disease | | | |
| Yes | 22 (81.5) | 21 (72.4) | 0.64, 0.31 |
| No | 5 (18.5) | 8 (27.6) | |
| Income | | | |
| Below 500,000 Toman | 16 (59.3) | 34.5 (26) | 3.86, 0.13 |
| 500,000-1 million Toman | 9 (33.3) | 7.4 (22) | |
| 1-1.5 million | 2 (7.4) | 20.7 (8) | |
| Above 2 million Toman | - | - | |
| Illness duration (years) | | | |
| Below 5 | 16 (59.3) | 18 (62.1) | 0.25, 0.88 |
| 6-10 | 8 (29.6) | 7 (24.1) | |
| 11-16 | 3 (11.1) | 4 (13.8) | |
| Age (years) | | | |
| 60-65 | 19 (70.4) | 19 (65.5) | 0.91, 0.46 |
| 66-70 | 10 (29.6) | 8 (34.5) | |

BP, GH, VT, SF, ER, and MH were significantly different with control group [Table 2].

DISCUSSION

This study conducted to investigate the effect of aerobics on the QOL of females aged 60–70 years who referred to the daily care center of the elderly home. Investigating the demographic characteristics of participants showed that more than half of the participants aged 60–65 years. The average age was about 63 years. Seventy-six percent of the participants had at least one type of chronic disease and were under treatment by a physician.

The degree of education of the majority of the participants was diploma and lower and only 9.5% had academic education. Another study reported 8.5% academic education among the elderly, although 66% of the participants were illiterate.^[24] This difference is explainable by the different inclusion criteria's. Mean scores of QOL in the physical dimensions of participants in preintervention stage indicate the mean scores of 52.13 ± 7.26 which was in harmony with other studies.^[25,26]

Regarding the psychological dimensions, the results showed 40.92 ± 7.13 . In the other study, this score was almost the same.^[20] In line with the findings of the present study, in other study, the QOL of elderly women in psychological dimensions was significantly lower than the mean scores of physical dimensions; however, the total score was lower. This difference is justifiable in view of the fact that the study samples of other study. However, in other studies the total score was lower. This difference is justifiable in view

Table 2: Testing the effects between exercise and control groups in the quality of life dimension through analysis of covariance

| Variable | Mean±SD | | P |
|----------------------|--------------------|---------------|--------|
| | Intervention group | Control group | |
| Physical functioning | | | |
| Pretest | 52.00±5.6 | 52.3±8.4 | 0.84 |
| Posttest | 77.40±8.5 | 54.22±5.4 | 0.000* |
| P | 0.000* | 0.15 | |
| Physical role | | | |
| Pretest | 46.8±20.9 | 42.5±23.4 | 0.47 |
| Posttest | 68.5±28.2 | 40.5±24.4 | 0.000* |
| P | 0.000* | 0.43 | |
| General health | | | |
| Pretest | 32.6±6.1 | 35.7±6.4 | 0.77 |
| Posttest | 44.1±5.7 | 35.7±5.4 | 0.000* |
| P | 0.000* | 0.39 | |
| Vitality | | | |
| Pretest | 44.0±11.5 | 40.6±11.5 | 0.26 |
| Posttest | 40.1±10.9 | 50.1±11.5 | 0.000* |
| P | 0.000* | 0.83 | |
| Social function | | | |
| Pretest | 50.04±12.4 | 52.6±9.7 | 0.46 |
| Posttest | 53.8±14.4 | 64.0±13.9 | 0.000* |
| P | 0.000* | 0.17 | |
| Pain | | | |
| Pretest | 44.0±10.9 | 42.3±12.2 | 0.47 |
| Posttest | 43.7±11.4 | 51.3±9.0 | 0.000* |
| P | 0.000* | 0.24 | |
| Emotional well-being | | | |
| Pretest | 44.0±10.9 | 42.3±12.27 | 0.58 |
| Posttest | 51.3±9.0 | 43.75±11.4 | 0.005* |
| P | 0.000* | 0.10 | |
| Social function | | | |
| Pretest | 44.2±8.2 | 43.6±7.4 | 0.88 |
| Posttest | 53.03±7.7 | 43.9±7.3 | 0.000* |
| P | 0.000* | 0.36 | |
| Mental QOL | | | |
| Pretest | 46.0±5.0 | 46.3±5.7 | 0.85 |
| Posttest | 52.4±5.4 | 44.7±4.4 | 0.000* |
| P | 0.000* | 0.80 | |
| Physical QOL | | | |
| Pretest | 41.9±6.6 | 43.6±6.6 | 0.33 |
| Posttest | 58±6.6 | 46.3±4.9 | 0.000* |
| P | 0.000* | 0.20 | |

*P<0.00. QOL: Quality of life, SD: Standard deviation

of the fact that the study samples of other study included older women living with their families. In a study conducted among the elderly residents of the Kahrizak nursing home, the results showed that the QOL of women in MH was low.^[27] The majority of participants (76.2%) showed a QOL score of <50 and 23.8% of them reported QOL score between 50 and 75. This finding was in harmony with other studies.^[28,29]

The results of the research hypothesis showed that the scores of the intervention group were significantly different as compared to the control after the intervention. This implies that the QOL of the intervention group significantly increased after the intervention while in the group showed slight change. The intervention group after the aerobic

exercises experienced lower physical pain, higher VT, and efficacy to contribute in social role and ER. Therefore, their GH has improved in all dimensions. This finding is in line with the results of other researchers.^[30-33] The results of study conducted by Ahmadi *et al.* showed active aged women had a higher QOL in compare to women with low activity.^[34] However, in other study, among 12 postmenopausal women (50–65 years old), 10 weeks aerobic training does not show a significant effect on QOL of the intervention group.^[35] These differences in the findings could be due to the inclusion criteria of the study in which the elderly were evaluated in terms of the level of physical activity before participation, as well as the number of sessions and types of exercises provided. In the present study, the number of sessions is higher. In addition, the number of samples in the other study may affect the results.

Low physical activity has a negative impact on one's functioning in society, interpersonal relations, or fulfillment of professional duties. Physical activity can play both preventive and therapeutic roles.^[36] A meta-analysis showed that aerobic training of older adults had the largest effect on cardiac function and mechanisms in favor of disease prevention and improvement of QOL.^[37]

Continuous exercises increase the sense of self-efficacy and reduce the fear of movement by participating in activity of people of similar age and status. This increases the physical activity and reduces the movement limitation and SF.

Regular aerobic exercise program increases the person's ability to do daily functions without being dependent on others and has a positive effect on other dimensions of QOL. Therefore, it can be concluded that regular exercise program and physical activity can increase the various dimensions of QOL, in particular, physical performance and roles in the individual.

This study was involved with some limitations; first engagement with the elderly due to fear of movement, distress, laughter, restlessness, and other physical and psychological problems, which led to omitting large number of elderly from the study.

Tracking the results of the research due to the difficulty in accessing the samples and the time constraints was another limitation. This study conducted in a one city in single center in the age range of 60–70 years and the homogeneity of samples was one of the limitations. In this study, self-reported method was used to evaluate the elderly in the field of chronic diseases. Therefore, it was probable that some elderly people, due to lack of regular

referral to the physician, did not have enough information about their physical condition and health, which is one of the limitations of the research.

Considering the importance of the physical ability of elderly people to keep their independency and psychological state, it is suggested that extensive studies be carried out with more samples. It is suggested to researcher to classify samples according to the levels of physical activity and ability in different groups and evaluate in terms of the effectiveness of aerobic exercise. In addition, considering the increasing use of social networks by the elderly, the impact of virtual education in the male and female elderly population should be investigated separately.

CONCLUSION

In general, it can be concluded that attending aerobic classes for 24 sessions and getting acquainted with the members of the group with fun activities in the presence of a specialist and nurse has caused the elderly group of intervention to feel more VT. Thereby, increasing the indecency of the elderly in daily work and leading to a successful aging process prevent from disease and costs.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

All authors contributed to this research.

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