

## Original Article

**The Effect of Educational Intervention on the Physical Activity of the Elderly**Fatemeh Masroor<sup>1</sup> Ehteramsadat Ilali<sup>2</sup> Nouroeddin Mousavinasab<sup>3</sup> **Zohreh Taraghi<sup>4\*</sup>**

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**Abstract**

**Background and Purpose:** Changing the physical activity pattern is an important factor in reducing mortality and increasing longevity. The aim of the current study was to determine the effect of educational intervention on physical activity of elderly people.

**Materials and Methods:** In this quasi-experimental study, 80 elderly people from two rural health centers in Ghaemshahr city were selected and assigned to intervention (n=40) and control (n=40) groups. The elderly in the intervention group received 4 training sessions of 30 to 45 minutes in a month, while the control group did not receive such training. Before and one month after the intervention, Rapid Assessment of Physical Activity (RAPA) questionnaire was completed by both groups. The collected data were analyzed using chi square, paired sample t-test, independent sample t-test and ANCOVA.

**Results:** The mean total score of RAPA, before intervention, in the control group was significantly higher than the intervention group ( $P = 0.017$ ). However, after the intervention, the mean total score in the intervention group was significantly higher than the control group ( $P < 0.001$ ). One month after the intervention, the mean of the RAPA score in the intervention group significantly changed from 2.1 to 4.95 ( $P < 0.001$ ), however, the mean change in the RAPA score in the control group (from 2.4 to 2.5) was not significant ( $P = 0.352$ ).

**Conclusion:** Given the effect of educational intervention on the physical activity of the elderly, the design of such educational interventions is recommended.

**Key words:** Education; Physical Activity; Elderly

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## 1. Introduction

Suitable physical activity is one of the most important health promoting behaviors (1), and inadequate activity accounts for 20% of deaths from cardiovascular disease, cancer and diabetes (2). Low activity can also lead to symptoms, such as osteoporosis, obesity, and depression (3). Inactive lifestyle in the elderly can also be attributed to muscle atrophy due to their lack of use, and it seems that it is responsible for more than 50% of physiological decline with aging, but it can be improved with appropriate exercise. The WHO recommends at least 30 minutes of moderate aerobic exercise 5 days a week (4). Even if the elderly is not able to physically move to the recommended level, they should exercise as much physical activity as possible (5). Changes in life style, such as physical activity and exercise at any age, can be important factors in reducing mortality and increasing longevity (6). The governments and international organizations and civil societies are able to overcome aging problems if they take planned measures and adopt dynamic programs for active aging (7).

Despite the benefits to physical activity, the findings of a national survey among Iranian adults showed that over 80% of the Iranian population is physically inactive (8), and the lowest physical activity is over the age group of 60 years (9); so that only 5-13.7% of the elderly have enough physical activity to reach general health (7). Given the wide range of mobility limitations for some elderly people (physical, psychosocial such as financial problems, lack of social support, depression symptoms, cognitive decline, and lack of adequate knowledge), encouragement of any type of activity, including physical activity seems vital (9). Another important factor that should not be overlooked is the elderly's place of residence. According to research, although the physical activity level of urban and rural elderly people is similar, the pattern of physical activity and its predictors vary (10). There are several reasons for the difference, which usually include limited financial resources and social isolation, which is more common in rural compared to urban areas.

Persons in rural areas have less access to facilities for physical activity, and are less educated and poorer than people in urban areas (11,12). Therefore, it is necessary to consider the environment of their life during the design of educational interventions. In this study, taking into account the field of work of the researcher, and the homogenization of the level of physical activity, the research population included rural elderly.

Although some studies have shown the effect of educational intervention on improving the physical activity of elderly people (1, 2, 6, 13, 14), in others, such an effect has not been observed (15-17). The likelihood that a person will behave in a particular way is influenced by some cultural or attitudinal factors (18). In our country, few educational interventions have been performed on the physical activity of elderly people, but they were either single-sex (1, 2, 14), or different from the current study in terms of the tool used to evaluate physical activity and teaching methods. The current study adopted Rapid Assessment of Physical Activity (RAPA) Scale designed by the University of Washington's Health Promotion Research Center (2006) for the elderly (19) with good sensitivity (81%) as well as positive and negative predictive value (77% and 75%, respectively) (20). The method of teaching in previous studies was lecture and group discussion. The film and slide shows were used in the current study. The study population was rural elderly. Given the inadequate physical activity of the elderly, the role of cultural factors, and the different means of evaluation and the method of education, the current study was designed to determine the effect of educational intervention on the physical activity of the elderly, which is hoped to be fruitful.

## 2. Materials and Methods

The sample size or the current study was calculated using the following statistical formula and according to Palmer study (2013) (15), with 95% confidence and 80% power, and the standard deviation of the physical activity score of the two groups (intervention and control) equaled 1.5, the least difference in

mean of the two groups (Intervention and control) was 1.3 in 36 subjects, given 10% of the fall, thus the study was conducted in two groups of 40 (intervention and control) elderly with inclusion criteria.

$$n = \frac{\left[ Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right]^2 \left[ \sigma_1^2 + \sigma_2^2 \right]}{(\mu_1 - \mu_2)^2}$$

The centers were randomly selected from 19 health centers in the villages of Qaemshahr. One was then considered as intervention group and the other as control group. Within each center, the researcher outlined the goals and method of the study, and selected 40 people from the elderly with systematic-randomly method.

The inclusion criteria were: age 60 and above, permanent residence in the village, minimum reading and writing skills for the elderly or one of the family members, score 4, and above based on the Abbreviated Mental Test (AMT) (21), the score below 9 based on Geriatric Depression Scale (GDS), and no limitation for physical activity, such as joint inflammation, bleeding or retinal detachment, eye surgery or laser treatment, hernia, recent surgery, coagulation disorders, dizziness or shortness of breath, pain or chest tightness, abnormal pulse rate or throbbing (22) based on the approval by the Center physician. Exclusion criteria included dissatisfaction for attending a meeting and absent in more than one training session (1), physical activity score 7, occurrence of any crisis during the study (acute illness or death of loved ones). The elders were included in the study after obtaining informed written consent and assuring them of the confidentiality of the information.

The data were collected by a questionnaire including a demographic-medical questionnaire (including age, gender, educational level, marital status, income status), underlying conditions including respiratory, renal, digestive, nervous, or thyroid problems, number of medications used, risk factors for cardiovascular diseases (overweight, high blood pressure, diabetes, hyperlipidemia, anemia), cognitive status, and

depressive symptoms based on AMT and GDS scores.

The researcher, referring to the authoritative sources of aging (22, 20), and under the supervision of the Gerontologist, selected the motions for warming up, strength, and balance. The educational package was confirmed by the 3 members of the academic sport medicine specialists in terms of validity. Then, the researcher conducted physical activity training in 4 sessions of 30 to 45 minutes in a month. First, she had a meeting with the target members, explained the research objectives, and decided on the time and place of the meetings to be held. In the first training session, safety tips, as well as, how to add gradual physical activity, physiological changes in aging, the classification of movements (endurance, flexibility, strength, and balance) were introduced to the participants by films and slideshows. In the second session, the importance of physical activity and exercise benefits, the subject of stretching movements of the neck, shoulder, arm, chest, back, waist, hip, trunk, thigh, back, and wrist (24 movements) were explained using video and slideshows.

In the third session, while reviewing the previous sessions, a demonstration and explanation of the strength exercises of the wrist, shoulder, arm, chest, back, waist, hip, trunk, buttocks, thighs, legs, and ankles (16 movements) were presented. In the fourth session, while reviewing the previous sessions, balance exercises (14 movements) were instructed. In the second to fourth sessions, the elderly were asked to perform each movement after a single observation. Educational sessions were attended by a researcher, physician, health center workers, and a faculty member of physical medicine. They, then, put videos and pictures into the computer at the village's healthcare center, and encouraged the participants to continue practicing as much as possible. However, they were asked to stop, when they felt extreme fatigue and abnormal symptoms, such as dizziness, shortness of breath, feeling pain or pressure in the chest.

One month after the end of the intervention (1), the researcher again distributed RAPA questionnaire among both groups, and compared the results with that of obtained prior to the trainings. In the current study, Rapid Assessment of Physical Activity (RAPA) Scale was used. This questionnaire was divided into two parts. The first part was about endurance activities with a seven dichotomous items (yes-no).

The questionnaire classified persons into 5 groups or levels: first level persons included without activity (score 1), second and third level persons were with low and non-regular activity, or low and regular activity (score 2), fourth level persons were with regular and moderate activity (score 3), and fifth level persons, included appropriate activity (score 4).

The second part was about stretching and strength activities, with a two dichotomous items (yes-no) that divided the participants into 4 groups: The individuals who performed strength exercises at least once a week were given score 1. Score 2 was given to people who did stretching at least once a week. Score 3 was given to those who did both strength and stretching activities at least once a week. Those who did not perform stretching and strength activities, even once a week, were also given 0 score. Thus, the maximum total score of the questionnaire was 7, and the minimum score was 1, and the higher score indicates more physical activity (23). This questionnaire has before been validated by Khajavi et al. (2015) in Iran. The Cronbach's alpha coefficient for the whole tool was found to be 0.87 (24).

Data analysis was done using SPSS Software version 18.0. To determine the effect of educational intervention on the physical activity of the elderly in each group, before and after the intervention, paired sample t-test was used. Independent sample t-test was also used to compare the changes in physical activity in both groups (intervention and control). Then, Chi square was used to compare the demographic variables in both groups.

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### 3. Results

The mean age of the participants in the intervention and control groups were  $65.25 \pm 4.16$  and  $67.43 \pm 6.96$ , respectively ( $P=0.95$ ). As is shown in Table 1, the two groups were homogeneous in terms of gender ( $P=0.232$ ), marital status ( $P=0.553$ ), education ( $P=0.151$ ), income ( $P=0.270$ ) and number of illnesses ( $P=0.620$ ). The most common underlying disease in both groups was hypertension. Chi-square test showed that hyperlipidemia ( $P<0.001$ ) were significantly more in the intervention group than the control group (Table 1).

**Table 1.** Comparison of the qualitative variables in the intervention and control groups

| Variables              | Control (n=40) |      | Intervention (n=40) |      | P     |
|------------------------|----------------|------|---------------------|------|-------|
|                        | number         | %    | number              | %    |       |
| <b>Gender</b>          |                |      |                     |      |       |
| Male                   | 16             | 40   | 10                  | 25   | 0.232 |
| Female                 | 24             | 60   | 30                  | 75   |       |
| <b>Marriage</b>        |                |      |                     |      |       |
| Single                 | 1              | 2.5  | 0                   | 0    | 0.553 |
| Married                | 32             | 80   | 33                  | 82.5 |       |
| Widow                  | 7              | 17.5 | 6                   | 15   |       |
| Divorced               | 0              | 0    | 1                   | 2.5  |       |
| <b>Education(year)</b> |                |      |                     |      | 0.151 |
| Without                | 20             | 50   | 26                  | 65   |       |
| 1                      | 2              | 5    | 0                   | 0    |       |
| 2                      | 3              | 7.5  | 7                   | 17.5 |       |
| 4                      | 2              | 5    | 0                   | 0    |       |
| 5                      | 7              | 17.5 | 5                   | 12.5 |       |
| 6                      | 2              | 5    | 2                   | 5    |       |
| 12                     | 3              | 7.5  | 0                   | 0    |       |
| 14                     | 1              | 2.5  | 0                   | 0    |       |
| <b>Income</b>          |                |      |                     |      |       |
| Less than E            | 11             | 27   | 16                  | 40   | 0.270 |
| Equal E                | 29             | 73   | 23                  | 57   |       |
| More than E            | 0              | 0    | 1                   | 3    |       |
| E=expenditure          |                |      |                     |      |       |
| <b>Disease number</b>  |                |      |                     |      | 0.620 |
| Without                | 3              | 7.5  | 0                   | 0    |       |
| 1                      | 12             | 30   | 10                  | 25   |       |
| 2                      | 6              | 15   | 9                   | 22.5 |       |
| 3                      | 4              | 10   | 8                   | 20   |       |
| 4                      | 8              | 20   | 7                   | 17.5 |       |
| 5                      | 4              | 10   | 3                   | 7.5  |       |
| 6                      | 2              | 5    | 2                   | 5    |       |
| 7                      | 1              | 2.5  | 1                   | 2.5  |       |
| Diabetes               | 14             | 35   | 9                   | 22.5 | 0.217 |
| Respiratory            | 3              | 7.5  | 6                   | 15   | 0.288 |
| Renal                  | 5              | 12.5 | 7                   | 17.5 | 0.531 |
| Hypertension           | 17             | 42.5 | 20                  | 50   | 0.501 |
| Digestive              | 10             | 25   | 10                  | 25   | 1     |
| Neurologic             | 7              | 17.5 | 6                   | 15   | 0.762 |
| Thyroid                | 2              | 5    | 2                   | 5    | 1     |
| Anemia                 | 3              | 7.5  | 9                   | 22.5 | 0.060 |
| Hyperlipidemia         | 2              | 5    | 18                  | 45   | 0.001 |

The mean of depression scores in the intervention group was  $2.72 \pm 1.8$ , and it was  $1.88 \pm 1.65$  in the control group (both below 4) that were not clinically significant. Mean scores of the Body Mass Index (BMI) in the intervention group were  $30.13 \pm 5.4$  and  $28.28 \pm 3.63$  in the control group, and there was no significant difference between the two groups ( $P=0.077$ ).

The Paired sample t-test showed that the mean score of RAPA1 was significant in the intervention group, compared to before the intervention. However, in the control group, the mean score of RAPA1 was not significant compared to the pre-study (Table 2).

**Table 2.** Comparison of RAPA1 before and after intervention

| Group                | Control                         | Intervention                    | Independent sample t-test |
|----------------------|---------------------------------|---------------------------------|---------------------------|
| RAPA 1               | <b>Mean <math>\pm</math> SD</b> | <b>Mean <math>\pm</math> SD</b> |                           |
| Before               | $2.3 \pm 0.6$                   | $2.1 \pm 0.3$                   | 0.068                     |
| After                | $2.35 \pm 0.73$                 | $2.42 \pm 0.67$                 | 0.636                     |
| Paired sample t-test | 0.421                           | 0.001                           |                           |
| Changes              | $0.05 \pm 0.38$                 | $0.325 \pm 0.57$                | 0.014                     |

The results of Paired sample t-test showed that the mean score of RAPA 2 was significantly higher in intervention group, compared to before the intervention ( $P$

$<0.001$ ). But in the control group, the mean score of the RAPA2 was not significant compared to the pre-study ( $P = 0.421$ ) (Table 3).

**Table 3.** Comparison of RAPA 2 before and after intervention

| Group         | Control                         | Intervention                    | Independent t-test |
|---------------|---------------------------------|---------------------------------|--------------------|
| RAPA 2        | <b>Mean <math>\pm</math> SD</b> | <b>Mean <math>\pm</math> SD</b> |                    |
| Before        | $0.1 \pm 0.44$                  | $0 \pm 0$                       | 0.160              |
| After         | $0.15 \pm 0.53$                 | $2.5 \pm 0.5$                   | $<0.001$           |
| Paired t-test | 0.421                           | $<0.001$                        |                    |
| Changes       | $0.05 \pm 0.55$                 | $2.5 \pm 0.51$                  | $<0.001$           |

The results of Independent sample t-test showed that the mean total score of RAPA, before intervention, was significantly higher in the control group than in the intervention group ( $P = 0.017$ ). However, after the intervention, the mean total score in the intervention group was significantly higher than the control group ( $P < 0.001$ ). The findings showed that the mean total

score of the RAPA was significant ( $P < 0.001$ ) after the educational intervention compared to before the intervention. But in the control group, the mean total score of RAPA after the intervention was not significant compared to the pre-study ( $P=0.352$ ) (Table 4).

**Table 4.** Comparison of total RAPA before and after the intervention

| Group             | Control                         | Intervention                    | Independent t-test |
|-------------------|---------------------------------|---------------------------------|--------------------|
| <b>Total RAPA</b> |                                 |                                 |                    |
|                   | <b>Mean <math>\pm</math> SD</b> | <b>Mean <math>\pm</math> SD</b> |                    |
| Before            | 2.4 $\pm$ 0.7                   | 2.1 $\pm$ 0.3                   | 0.017              |
| After             | 2.5 $\pm$ 0.9                   | 4.95 $\pm$ 0.78                 | $P < 0.001$        |
| Paired t-test     | 0.352                           | $P < 0.001$                     |                    |
| Changes           | 0.1 $\pm$ 0.67                  | 2.85 $\pm$ 0.69                 |                    |

ANCOVA test showed that the intervention significantly improved the

physical activity level of the intervention group (Table 5).

**Table 5.** Tests of between subjects effects

| Source  | Sum of Squares | df | Mean Square | F       | Sig  |
|---------|----------------|----|-------------|---------|------|
| Pretest | 1428.02        | 1  | 1428.02     | 1833.51 | .000 |
| Group   | 46.22          | 1  | 46.22       | 59.35   | .000 |
| Error   | 60.75          | 78 | 0.779       |         |      |

In fact, the results of above table showed that after omitting the effect of pretest as a confounding factor, there was a significant difference between the two groups (intervention and control) after the intervention.

#### 4. Discussion

The results of Independent sample t-test showed that there was no significant difference between the two groups (intervention and control) after the intervention. This finding was consistent with that of Eshaghi et al., (2010), which evaluated the effect of religious-based instruction on physical activity of the elderly (6). The researchers believed that health education was used with different patterns and methods. Religious beliefs are among the individual values that can strengthen the motivation of individuals to carry out certain behaviors. But in their study, both types of educational interventions (with and without religious teachings) had a positive effect on physical activity, and there was no significant difference. In the current study, although the control group did not receive any training, the pre-test effect should not be overlooked.

Palmer et al. (2013) assessed changes in physical activity in community-dwelling older adults associated with the Matter of Balance Volunteer Lay Leader Model program (15). They used only the aerobic portion of RAPA (RAPA1). Their scoring style was different from our study. Their possible scores ranged from 1 to 7, based on the highest numbered item circled. The results showed that education did not improve the physical activity level of the elders significantly. The authors cited the cause of lack of effect as a possible lower

sample size. Ten people (20.8%) had a RAPA1 score of 7, before the intervention (ceiling effect). As a result, the effect of the intervention could not be shown

On the other hand, the results of Paired sample t-test showed that the mean score of RAPA1 was significant in the intervention group, compared to before the intervention. This finding was consistent with the studies of Karimi et al. and Amirzadeh Iranagh et al. (1, 14).

The findings of the current study also showed that there was a significant difference between the two groups (intervention and control) after the intervention. These findings were found consistent with that of Shams et al., (2011) and Sadeghi et al., (2007). In the current study, educational intervention was conducted for 4 sessions of 30 to 45 minutes per month and the elderly were asked to tailor their abilities accordingly. In the above studies, the duration of exercise was 30-60 minutes, 3 times per week (25, 26), for 5 weeks (25) or 6 weeks (26). Healthcare providers, especially nurses, can help improve balance, and subsequently reduce the fall of the elderly by implementing such programs.

A systematic review and meta-analysis (including 345 articles for initial review out of which 23 studies met the inclusion criteria) quantified dose-response relationships of balance training modalities (i.e., training period, training frequency, training volume) to maximize improvements in balance performance in healthy adults aged 65 years and older. The analyses revealed that an effective balance training protocol was characterized by the following independently considered training modalities to improve the balance



performance in healthy older adults: a training period of 11-12 weeks, a frequency of three sessions per week, and a duration of 31-45 min of a single training session (27).

The results of ANCOVA test also showed that the intervention improved the physical activity level of the intervention group significantly. This finding was in line with some other previous studies. A program in Australia employing group education and goal setting sessions, did not increase pedometer-measured step counts among culturally and linguistically diverse older adults (17). A Cochrane review found no evidence for the effectiveness community level intervention (16). After the selection process had been completed, 25 studies were included in the review. Of the included studies, 19 were set in high income countries, and the remaining six were in low income countries. The reason of inconsistent results of our study may be related to the short time follow up. The follow up of our study was one month after the end of intervention (two months from the start of the intervention); however, in the Cochrane review, only studies with a minimum six-month follow up from the start of the intervention to measurement of outcomes were included.

Changes in lifestyle patterns, such as physical activity, and exercise at any age can be important factors in reducing mortality and increasing longevity. Given the results and the effect of educational intervention on the physical activity of the elderly, the design of such educational interventions in centers with elderly groups' participation, including parks, was then recommended.

### **Limitation**

In both clinical research and clinical practice, subjective measurement of physical activity is the choice due to the

simplicity, low cost, speed and ease of administration. A significant limitation in this study was the use of a self-report measure for physical activity (subject to recall and response biases) rather than more objective instrumented methods, such as accelerometers and step counters. Short time follow up was another limitation of our study.

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**Conflict of interest:** None

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