Original Article

The effect of progressive muscle relaxation on depressive symptoms in elderly people

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Abstract

Context: Depression is one of the most common old-age psychiatric disorders.

Aims: The present study was conducted to determine the effect of progressive muscle relaxation on depressive symptoms in elders.

Setting and Design: This quasi-experimental study was conducted in two seniors daycare centers of Mazandaran in 2019.

Materials and Methods: A total of 76 elderly people divided into intervention and control groups (38 each). The intervention group performed relaxation exercises twice a day for 30 days, and the control group received only the routine cares. The two groups' depression was assessed before and a month after relaxation using the Geriatric Depression Scale.

Statistical Analysis Used: Data were analyzed in SPSS-22 using Mann–Whitney and Wilcoxon tests.

Results: After a month, depression score in the intervention group reduced from 7.13 ± 1.14 to 5.55 ± 0.98 ($P < 0.001$), but the score change in the control group was not significant (from 7.13 ± 0.96 to 7.18 ± 0.83) ($P = 0.655$). The intervention significantly changed depression score in elders ($P < 0.001$).

Conclusion: A month of progressive muscle relaxation appears to improve depressive symptoms in elderly people. Implementing of such measures is recommended in the day care centers.

Keywords: Aged, Depressive symptoms, Progressive muscle relaxation

INTRODUCTION

Old age is a natural stage of life that is extremely different from other stages.[1] People's mental and social activities gradually diminish with aging. The onset of old age, may lead to depression, hopelessness, isolation, loss of self-esteem, and even death.[2] Depression is

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defined as a disorder that lasts for quite some time and that has specific symptoms.[3] It includes one of the two symptoms (depressed mood and anhedonia) with four or more of the following symptoms, lasting for at least 2 weeks: feelings of worthlessness or guilt, reduced ability to concentrate or make decisions, fatigue, agitation or retardation, insomnia or hypersomnia, significant loss of appetite or weight gain, and suicidal ideation.[4] The prevalence of depression is 4.9% in community-dwelling elderly, 10%–12% in hospitalized ones, and 14%–42% in the ones in nursing homes.[5] In Iran, Mirzai quoting Rahgozar reported the prevalence of depression in the elderly countrywide 22.4%.[6,7] In a systematic review, the prevalence of depression in Iranian elderly living at home was reported 57.58%.[8] The precise prevalence of depression in elderly people in Mazandaran province is not known. Depression entails such complications as isolation and withdrawal from society and considered a social challenge.[9] Furthermore, it is also regarded as one of the most common causes of suicide in elderly people, accounting for 24% of successful suicides.[10]

Progressive muscle relaxation is one of the nonpharmacological interventions that may be effective in reducing tension caused by chronic diseases, psychological tensions, anxiety, social function, depression, and pain.[11] This technique has always been considered as one of the best complementary methods, given its simplicity and cost-effectiveness.[12] In progressive muscle relaxation, the person feels progressively relaxed through active contraction followed by relaxation of a specific muscle groups,[13] causing increased blood flow and improved organ blood supply function. A significant relationship is observed between relief of muscle stress and tension and reduced anxiety and depression.[14] In addition, it increases the sense of self-control.[15] Studies conducted in Iran showed the role of progressive muscle relaxation in reducing depression in cancer patients,[16] depression in primiparous women,[14] and improved quality of life in elderly people,[17] but had no effect on depression in patients undergoing hemodialysis,[12] and those with multiple sclerosis.[18]

Considering the high prevalence of depression symptoms and their effect on the quality of life in elders, and lack of a study on Iranian elderly, and given cost-effectiveness and simplicity of relaxation techniques,[12] and also effects of relaxation in different diseases,[12,16,18] and increased chance of developing diseases in elders,[19] the present study was conducted to determine the effect of progressive muscle

relaxation on depressive symptoms in elderly people attending daycare centers.

MATERIALS AND METHODS

Research design and setting
Two daycare centers were selected out of seven, one from Sari and one from Ghaemshahr, which matched in terms of educational, exercise, art, and religious activities. Then, one center was randomly considered the intervention group and the other as the control group.

Sample size and sampling procedure
Elders were selected according to the following inclusion criteria: 60 years of age and older, ability to communicate, with no cognitive disorders (cognitive test score ≥ 7), mild-to-moderate depression according to Geriatric Depression Scale (GDS) (score 5-11), having a mobile phone, reading and writing literacy or a literate family member, no use of opioids, alcohol, cigarette, and no use of other relaxation techniques during the study. The exclusion criteria were incidence of physical (surgery) or psychological (mourning or divorce) crises during the study, unwillingness to take part, failure to carry out relaxation in more than 10% of cases during the study, and death.

According to a study conducted by Vakilabad *et al.*, depression in elderly people was 9.65 ± 1.137 before intervention. Using the following equation and taking $\alpha = 0.05$, power 0.90, and considering at least 1 point difference between intervention and control groups in depression score changes, the sample size was determined 32 participants per group, which was increased to 38 participants for possible withdrawals.[20]

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

$$= \frac{[1.96 + 1.28]^2 \left[1.2^2 + 1.2^2 \right]}{1^2} = 32$$

The researcher explained the study objectives and method, identified eligible elderly, obtained their informed written consent, and assured them of confidentiality of data before selecting 38 participants out of eligible elderly, and assigned them to the intervention group using Excel Rand-Between software. Then, the control group was matched with the intervention group in terms of age, gender, education, income, and depression score.

Data collection tool and procedure
Data were collected using a demographic questionnaire (age, gender, and marital status, education, and income, place of

residence, underlying diseases, and medication history), GDS, and cognitive status.

Initially, these questionnaires were completed by both groups. Relaxation technique was taught face-to-face to elders in the intervention group over two sessions (first session lasting 30 min, and the second 15 min), so that they could gently contract 18 groups of muscles (forehead, eyes, tongue, lips, neck, shoulders, scapulae, right hand, left hand, chest, abdomen, buttocks, right knee, left knee, right foot, and left foot) from head toward feet for 5 s each, and then gently relax them over 30 s. In the second session, older adults listened to a CD and practiced in the presence of the researcher. After teaching the relaxation technique and receiving favorable feedback, the audio file of relaxation exercises was uploaded in intervention group's mobile phones, and exercises were scheduled. Each relaxation session lasted about 15 min. After ensuring the subjects' learning, they were asked to perform relaxation exercises twice a day (once in the morning and once at night before sleep) for 30 days according to the schedule.[12] As a reminder, they were followed up by telephone once a week and a checklist of relaxation record was completed. No intervention was carried out for the control group. After a month, Geriatrics Depression Scale was completed again by both groups and compared to baseline measurements. On the second occasion, the questionnaire was completed in the daycare center with the researcher present. The audio file of progressive muscle relaxation was validated by Yousefi *et al*.[21] To learn the progressive muscle relaxation skills, the researcher visited an expert in the field of relaxation in the counseling center and received a certificate.

GDS-15 is a specific questionnaire designed by Yesavage (1983). The 15 items are answered "Yes" or "No." Scoring 0–4 indicates no depression, 5–8 mild, 9–11 moderate, and 12–15 severe depression. Its validity and reliability were confirmed in Iranian elderly by Malakouti *et al*., with a cut off point 8, sensitivity 0.90, and specificity 0.83.[22]

Cognitive status was assessed using the Abbreviated Mental Test (AMT), designed by Hodkinson. This valid questionnaire contains 10 two-option items, which quickly assess cognitive impairment in older adults. Each correct answer scores one point, and sum of all points makes up the total score.[23] Translation, validity and reliability of AMT were carried out in Iran by Foroughan *et al*. (2008), with ideal cut off point of 6, sensitivity of 85% and specificity of 99%, and scoring <7 is regarded as "suspected dementia."[24]

Data analyses

Data were analyzed using the Statistical Package for the

Social Sciences version 23.0 (IBM Corp., Armonk, N.Y., USA) for windows. Shapiro–Wilk test was used to test the normality of variables. Chi-square test and independent *t*-test were used to compare demographic variables in the two groups. Mann–Whitney was used to compare depression score in two groups and Wilcoxon sign-ranks test was used to compare depression score in each group before and after the intervention. The significance level was considered <0.05 in all tests.

Ethical consideration

After obtaining permission from Mazandaran University of Medical Sciences Ethics Committee (Approval No. IR. MAZUMS. REC.1397.3220), the purpose of this study was explained to the elders and told them, they could be excluded, whenever they wanted. All participants were assured that the information obtained, will remain confidential, and the oral and written informed consent was obtained from them.

RESULTS

The mean age was 64.95 ± 4.67 years in the intervention group and 65.68 ± 3.65 years in the control group, with no significant difference between them ($P = 0.447$). In both groups, 28 (73.7%) were women and 10 (26.3%) were men.

No significant differences were observed between the two groups in terms of marital status, living arrangement, and communication with children, education, income, number of medications used, and history of depression. There were more subjects with chronic diseases in the intervention group than those in the control group. The most frequent chronic disease was heart disease in the intervention, and hypertension in the control group [Table 1].

No significant difference was found between the two groups in mean cognitive score ($P = 0.254$).

Mann–Whitney test results showed no significant difference between the two groups in terms of mean depression score before intervention, but this difference was significant after intervention. Moreover, Wilcoxon test results showed significant differences in mean score of depression before and after intervention in the intervention group. However, no such a difference was observed in the control group. The reduction in depression score was significant in the intervention group compared to the control, and therefore, the intervention was effective ($P < 0.001$) [Table 2].

DISCUSSION

Before comparing the present study results with other results,

Table 1: Comparison of intervention and control groups in terms of demographic-medical characteristics

Variable	Intervention, *n* (%)	Control, *n* (%)	Test (χ^2)	*P*
Marital status				
Married	30 (78.9)	31 (81.6)	0.083	0.773
Single/widowed	8 (21.1)	7 (18.4)		
Living arrangement				
Spouse	16 (42.1)	15 (39.5)	0.232	0.890
Children	8 (21.1)	7 (18.4)		
Spouse and children	14 (36.8)	16 (42.1)		
Communication with children				
Daily	30 (78.9)	32 (84.2)	0.350	0.554
Weekly	8 (21.1)	6 (15.8)		
Education				
Illiterate/primary school	7 (18.4)	12 (31.6)	2.240	0.524
Junior high school	7 (18.4)	8 (21.1)		
High school diploma	12 (31.6)	9 (23.7)		
University	12 (31.6)	9 (23.7)		
Income				
<expenses	24 (63.2)	28 (73.7)	0.974	0.324
≥expenses	14 (36.8)	10 (26.3)		
Number of medications				
≤3	18 (47.4)	25 (65.8)	2.624	0.105
≥4	20 (52.6)	13 (34.2)		
History of depression				
Yes	9 (23.7)	7 (18.4)	0.317	0.374
No	29 (76.3)	31 (81.6)		
Disease type				
Diabetes	7 (18.4)	3 (7.9)		
Renal disease	1 (2.6)	0 (0)		
Heart disease	8 (21.1)	12 (31.6)		
Hypertension	6 (15.8)	22 (57.9)		
Other diseases	16 (42.1)	1 (2.6)		

Table 2: Mean depression scores before and after intervention in two groups

Group/depression score	Intervention, mean±SD	Median	Control, mean±SD	Median	Mann-Whitney, *P*
Before intervention	7.13±1.14	7.00	7.13±0.96	7.00	0.845
After intervention	5.55±0.98	5.50	7.18±0.83	7.00	<0.001
Wilcoxon test, *P*	<0.001		0.655		
Changes before and after	−1.58±0.79	−2	0.05±0.73	0	<0.001

SD: Standard deviation

it should be reminded that despite the search in available databases, no study was found on elderly people. Hence, studies with similar intervention and outcome were used.

The present study results showed that progressive muscle relaxation significantly reduced depression in elders. This result agrees with those in studies conducted by Merakou *et al.*,[25] Ramasamy *et al.*,[26] Ebrahem and Masry,[27] and Li *et al.*,[28] but disagrees with those in studies conducted by Juan *et al.*,[29] Yilmaz *et al.*,[30] Ghobadi *et al.*,[12] and Ghafari *et al.*[18]

The study by Merakou *et al.* was conducted on 50 long-term unemployed individuals suffering from anxiety disorder. The study inclusion criteria were no other mental disorders and physical diseases. Participants were divided into intervention (*n* = 30) and control (*n* = 20) groups. The intervention group attended relaxation training program with counseling, and the control group only received counseling. The weekly training program included four

45-min sessions, plus a 12-min relaxation CD, so that participants could do the exercises twice daily at home. At the end of the fourth session, participants were asked to perform exercises twice daily at home for another month. The tool used was the 21-item Depression Anxiety Stress Scales (DASS-21. The mean age was 34 years in the intervention group and 32 years in the control group. The majority of participants in both groups were women.[25]

Participants in the Ramasamy *et al.* study included 50 patients with leprosy, who were trained to perform progressive muscle relaxation exercises for half an hour, twice a day, 5–6 times/week for 6 weeks. Their depression was assessed 1 and 6 weeks after the intervention using a researcher-made questionnaire. The study inclusion criteria were: 18–60 years of age, using no other relaxation techniques, no cigarette or alcohol use. Of all participants, 48% were 18–30 years old. 72% were men. Depression scores significantly decreased 2 and 6 weeks after the intervention (*P* < 0.001).[26]

In the Ebrahem and Masry study, 70 diabetic patients were assigned to intervention and control groups using the table of random numbers. The control group received five 30-min sessions of education on diabetes, nutrition, and other care issues, and the intervention group was taught cognitive-behavioral, stress reducing, and progressive muscle relaxation techniques over five 30-min sessions, and were asked to perform this technique twice a day. Participants were assessed before the intervention, at the end of the 5th session, and 2 months after the intervention using the 42-item depression, anxiety, and stress scale. Participants' mean age was 57.9 years, but their sex distribution was not given.[27]

In the study by Li *et al*., 130 patients with pulmonary hypertension were randomly assigned to intervention and control groups. The intervention group performed progressive relaxation exercises once a day for 40 min over 12 weeks and the control group carried out stretching and balancing exercises over the same period. The study inclusion criteria were stable medical condition for at least 2 months, and having primary school education and higher. The exclusion criteria were personal or family history of mental diseases, use of psychiatry or oncology medications, and use of anxiolytic and anti-depression medications. Data were collected using Hospital Anxiety and Depression Scale (HADS). About 45% of participants were older than 60 years, 67% in the control group and 74% in the intervention group were women.[28]

Juan *et al*. enrolled 60 patients with cancer, who were randomly divided into intervention and control groups. The intervention group received 20 min of progressive muscle relaxation every day, followed by 20 min of traditional Chinese music. The control group had 20 min of progressive muscle relaxation every day, followed by 20 min of rest. The intervention lasted for 8 weeks. The HADS was used. The study inclusion criteria were minimum age of 18 years, minimum primary school education, no mental disorders, and no deafness. The mean age was 61 years in the intervention group and 62 years in the control. Of the intervention group, 53%, and of control 46% were men. The changes in depression score in the intervention group were significant compared with both before intervention ($P < 0.01$) and with the control group ($P < 0.05$), but the changes were not significant in the control group that only used progressive muscle relaxation.[29] The difference in the nature of cancer compared to other diseases could be the reason for this. Diagnosis and treatment of cancer leads to profound emotional problems in the patient. In addition, the patient's occupational, socioeconomic status, and family life will also be impaired. Patients undergoing chemotherapy mostly experience a wide range of symptoms and side-effects such as nausea, vomiting, pain, insomnia, loss of appetite, and fatigue, which can affect severity of depression symptoms.[31]

In Yilmaz *et al*.'s study conducted on caregivers of elderly people with stroke, caregivers were randomly divided into intervention (23 patients) and control (21 patients) groups. Progressive muscle relaxation was performed 3 days/week for 8 weeks. The mean age was 80.15 years in older adults with stroke, and 50.29 years in their caregivers, 84% of caregivers were women, 38.6% had primary school education, and 86.4% were married. Depression was assessed using Beck's Depression Inventory.[30] Although depression reduced in the intervention group compared to before the intervention, this reduction was not significant compared to control group. This may have been due to conducting intervention only 3 days/week.

In an experimental study, Ghobadi *et al*. investigated the effect of progressive muscle relaxation technique on anxiety and depression in patients undergoing hemodialysis. The statistical population consisted of all hemodialysis patients over 35 years of age attending Imam Reza Teaching Hospital in Kermanshah, of who 42 were selected as the statistical sample and randomly divided into intervention and control groups. The inclusion criteria were score ≥11 in HADS. The intervention comprised two sessions for introducing the objectives of the study and face-to-face training of relaxation. Each relaxation session lasted 15 min. After ensuring the participants learned the technique, they were asked to perform relaxation exercises twice a day for 30 days. The control group received no intervention. The assessment tool used was HADS. At the end of the study, HADS was completed by both groups, and the results were analyzed using independent and paired *t*-tests. The patients' mean age was 53 years. A significant difference was observed between intervention and control groups in terms of mean anxiety score ($P = 0.0001$), but no significant difference was found between them after intervention in mean depression score ($P = 0.473$). In other words, progressive muscle relaxation was not effective on depression of patients undergoing hemodialysis,[12] which may have been due to the certain quota considered for depression score for inclusion in the study. Furthermore, mean duration of dialysis in the intervention group was significantly longer compared to the control, and its effect was not eliminated by statistical methods.

In Ghafari *et al*.'s study, 70 patients with multiple sclerosis were randomly assigned to intervention and

control groups. The intervention was carried out once a day over 2 months using 20 min of audio tape. Participants were divided into four groups, and a number of training sessions were held for each. The control group received the routine care. Data were collected using DASS-21. The inclusion criteria were using no other relaxation techniques, no acute or chronic physical or mental diseases, no impaired speech or hearing, and reading and writing literacy. No significant difference was observed between intervention and control groups in three occasions of measuring depression and anxiety (before intervention, a month after, and 2 months after). However, the difference in mean stress between the two groups was significant on the three measuring occasions ($P < 0.001$). Of participants, 75% were aged 20–35 years, 78% were women, only 15% had less than diploma education, and the rest had higher than diploma. The authors attributed the inefficacy of the intervention to the complexity of depression in this disease, and the effect of debilitating symptoms of the disease (pain and mood disorder), medication side-effects, and the relationship between fatigue and disease symptoms. In addition, for better results, they recommended conducting the technique for a longer period.[18]

CONCLUSION

The results generally showed that progressive muscle relaxation is effective in reducing depression in elderly people. Implementing of such measures is recommended in the day care centers.

Conflicts of interest
There are no conflicts of interest.

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