Evidence Based Care Journal
http://ebcj.mums.ac.ir/

Effects of In-Person and Distance Exercise Training on Outcomes of Knee Injury and Osteoarthritis among Elderly Individuals with Limited Literacy

Forouzan Farzad, Hamidreza Behnam Vashani, Amin Azhari, Mohammd Hasan Jokar, Zahra Emami Moghadam

The online version of this article can be found at
http://ebcj.mums.ac.ir/article_10561.html

Evidence Based Care Journal 2018 08:45 originally published online 01 April 2018
DOI: 10.22038/ebcj.2018.28332.1685

Online ISSN: 2008-370X

Address: Mashhad Nursing and Midwifery School, Ebn-e-Sina St., Mashhad, Iran
P.O.Box: 9137913199
Tel.: (098 51) 38591511-294
Fax: (098 51) 38539775
Email: EBCJ@mums.ac.ir

Evidence Based Care Journal

Original Article

OPEN ACCESS JOURNALS

Effects of In-Person and Distance Exercise Training on Outcomes of Knee Injury and Osteoarthritis among Elderly Individuals with Limited Literacy

Forouzan Farzad [1], Hamidreza Behnam Vashani[2], Amin Azhari[3], Mohammd Hasan Jokar[4], Zahra Emami Moghadam[5*]

Received: 16/12/2017
Accepted: 03/04/2018

Evidence Based Care Journal, 8 (1): 45-54

Abstract

Background: Osteoarthritis is a common chronic disease of the musculoskeletal system in older adults.

Aim: This study aimed to compare the effects of in-person and distance exercise training on the outcomes of knee injury and osteoarthritis among the elderly with limited literacy.

Method: In this two-group randomized clinical trial with a pretest-posttest design, 60 elderly patients with knee osteoarthritis selected from two public parks in Mashhad during 2017-2018 were assigned to two groups of In-person and Distance training. The educational content, which included two stretching and three strength exercises for knee injury and osteoarthritis, was presented to the Distance group using booklets and multimedia. In the In-person group, the exercises were trained in eight 30-minute sessions, two days a week. The Western Ontario and McMaster Universities Osteoarthritis questionnaire was completed before and two months after training the exercises. To analyze the data, Mann-Whitney U test and Wilcoxon signed-rank test were run in SPSS, version 16.

Results: The mean ages of the In-person and Distance groups were 68.2±5.6 and 69.2±9.4 years, respectively. We found a significant difference in the outcomes of knee injury and osteoarthritis post-intervention between the In-person and Distance groups (13.8±14.0 vs. 5.0±2.6; $P \leq 0.003$).

Implications for Practice: Both methods could affect the outcomes of knee osteoarthritis. The in-person method was superior to distance training. These exercises are recommended as safe methods that could be included in health promotion programs targeting older adults.

Keywords: Distance training, Elderly individuals, Exercises, In-person training, Limited literacy, Osteoarthritis

---

1. MSc Student in Community Health Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
2. Instructor of Pediatric Nursing, Evidence-based Care Research Center, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
3. Assistant Professor, Department of Physical Medicine and Rehabilitation, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Associate Professor, Rheumatologist, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Associate Professor of Community Health Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

* Corresponding author, Email: EmamiZ@mums.ac.ir

Introduction

Aging as a biological and physiological process is an inevitable phenomenon. The world's population is rapidly growing older. Increased life expectancy indices, improved healthcare status, and reduced fertility rate all have led to an ascending trend in population aging (1, 2). The elderly population across the world is estimated to rise from about 840 million in 2013 to more than 2 billion people by the middle of the 21st century (3, 4). Surveys in Iran have similarly indicated a growth in its aging population. According to the 2012 Population and Housing Census, elderly individuals constituted approximately 8.2% of Iran's population (5, 6). Based on the results of the 2016 Population and Housing Census released by the national website of Statistical Center of Iran, the number of individuals aged over 60 years was 8.47% of the 6634501 population in Khorasan Razavi Province, Iran (7).

Obviously, infliction with chronic diseases in the elderly population has significantly increased compared with acute diseases due to changes in the population structure and aging. Moreover, the rates of mortality and disability have further increased (8, 9). A significant share of health problems among older adults is comprised of non-infectious and chronic diseases (5). The cost and duration of treatment for such diseases is 20-30 times greater than acute ones (10), and musculoskeletal problems are considered as common chronic non-communicable diseases (8). Such diseases are the main cause of disability; they not only have a significant impact on health status and quality of life, but also impose huge burdens on healthcare systems. Similarly, studies have reported the prevalence of knee injuries and osteoarthritis in people aged 65 years or older by 60-90% (11).

Among the large joints of the body, the knee is the most common site of osteoarthritis in Iran (12, 13). Due to withstanding tremendous pressure, the knee joint is the most prone joint to the development of osteoarthritis (14). Knee osteoarthritis is thus considered as a chronic degenerative joint disease caused by damage to the articular cartilage (15). The symptoms of knee osteoarthritis are pain, stiffness, and limitation in joint mobility (16). In osteoarthritis, limited joint movements can reduce pain; however, these restrictions can bring about considerable complications such as atherosclerosis, decreased range of motion of the knee, damage to cartilage health, reduced bone strength, and ultimately, further pain.

Patients experiencing osteoarthritis-inducing pains often lower their level of activity to relieve such pains. Low levels of activity can have a reverse effect and cause pain, stiffness, and increased muscle burnout. It should be noted that the role of exercise in weight loss, strength of the tissues surrounding the joints, reduced pain, and cardiovascular health is even comparable to drug therapy (17). In this respect, Mehrabian et al. suggested that an aquatic exercise program would be a safe and effective method in improving pain, functioning, and quality of life of the elderly women suffering from knee osteoarthritis (18). Strength and stretching exercises were also reported to prevent secondary injuries and disabilities (16, 17).

Therefore, performing regular exercises not only improves physical strength, but also decreases pain intensity, hence enhancing motor performance in patients (11). Investigations have shown that exercise and physical activity can diminish the risk of falls and motor functioning limitations in older adults. Exercise is one of the effective preventive methods to delay and treat problems caused by aging (6). Performing exercises can also boost the strength of the knee muscles such as quadriceps and hamstrings. Stronger muscles can moderate the pressure on the articular cartilage, which may reduce inflammation and pain (19).

The educational role of nurses, especially in the domains of community health promotion and prevention, has its own specific place in the health team (20). A community health nurse deals with the education of individuals, families, and societies through the use of knowledge as well as new methods and technologies in providing educational services at the level of needs-based prevention (21). Insufficient skills of the elderly in reading, computing, and decision-making, as well as their sensory, perceptual, age-associated changes can influence their ability to read and understand health information. Currently, most trainings and information in health systems are presented in written forms and above the level of understanding of the elderly (22, 23). It should be noted that the effect of educational programs in patients with musculoskeletal problems and different levels of education is not the same. Inadequate information about the impact of educational interventions on patients with limited literacy will emerge in the form of poor health literacy (24).

There are conventional in-person methods to teach patients and clients including personal or face-to-

face training, discussion, and presentation that are used individually and collectively. With the advancement of technology and communication, it is possible to utilize other teaching methods in a virtual or e-learning training form using educational video clips or print media such as booklets, leaflets, and pamphlets (25, 26). In-person education is among the first and most important and effective types of training. Lecture is also considered as the most commonly used educational method whose benefits include understanding educational contents by learners who cannot read the materials very well, expressing the contents in plain language, as well as providing simultaneous education to a large number of individuals (27, 28). The most common way to teach patients is holding educational workshops. However, with the advancement of technologies in the domain of educational methods, new teaching methods for patients with limited literacy can be employed (28).

As regards distance education, learners can take part in training sessions anywhere and often at any time and reduce costs. To choose the educational methods in this domain, cost-effectiveness, flexibility, increased quality, accessibility, and ease of implementation should be taken into account. Meanwhile, culture-building and promoting novel educational technologies can provide a precondition for all the elderly to have access to educational programs and to reach the ultimate goal of changing behaviors and promoting health status (29). Lack of adequate skills in older adults in terms of reading, computing, and decision-making as well as sensory and perceptual changes experienced during aging can also affect their abilities in reading and understanding health information. Currently, most trainings and information in health systems are presented in written form and above the level of understanding of the elderly (21).

In a study conducted by Mortazavi et al. on elderly patients with osteoarthritis, it was revealed that self-management education could improve physical functioning, and consequently, affect joint stiffness (30). The Osteoporosis Research Society has also recommended in-person aerobics exercises as well as water workouts for patients with osteoarthritis and emphasized on self-care and education (31). Reviews of studies conducted in this domain such as a systematic study and analysis in Saudi Arabia by Anwer et al. (2015) further demonstrated that although the results of at-home exercise programs and interventions used in various investigations were often different, most of these studies had reported significant levels of progress in the improvement of pain and performance in patients suffering from osteoarthritis. Besides, the mentioned analysis suggested that at-home exercise programs with and without supervision of clinics were effective in improving osteoarthritis (32).

Considering the impacts of the two educational methods on the elderly, the results of a study by Abedi et al. (2014) revealed that nutrition and healthy lifestyle education to older adults through educational movies was more efficient and effective compared to books (29). Leo et al. (2013) in a review study entitled as "the effect of educational interventions on limited-literacy people with musculoskeletal problems" also examined the effect of teaching patients with low levels of literacy via different methods. Walker et al. (2007) compared the effect of booklets and conceptual maps in patients with rheumatoid arthritis as well, and an investigation by Hill and Bird (2003) similarly shed light on the impact of teaching drug information to patients suffering from rheumatoid arthritis through leaflets. The results of the study by Darmawan et al. (1992), in which individuals with arthritis were trained by puppets, showed that the effects of the provided information were short-term. In addition, Geoppiner et al. (2007) reported the insignificant effect of education on individuals' self-efficacy. The findings of a study by Rudd et al. (2009) similarly suggested the slight impact of education on individuals' self-efficacy in terms of the management of inflammatory arthritis.

Moreover, Rana et al. (2010) in their study of health education in limited-literacy patients with arthritis reported increased ability as well as self-perception regarding health and well-being. Although studies examining the application of training methods and tools in individuals with limited literacy have been successful, the heterogeneity of the measurement instruments and the point that only English-language articles were used were among the major limitations of those studies (24). A study conducted by Abedi et al. entitled as "the effect of two traditional and e-learning methods on healthy lifestyle in the elderly nutrition" showed that training through video tutorials compared with teaching through books could increase nutritional knowledge more effectively, and older people could consequently feel more satisfied (29).

Despite the prevalence of the chronic disease of osteoarthritis and the effect of exercise on preventing secondary injuries to joints and disabilities (17), there are limited studies on the use of appropriate

training methods and tools that can be also employed in self-care education for chronic diseases such as knee osteoarthritis among the elderly as a vulnerable portion of the population. With this background in mind and given the differences in culture and literacy levels of older adults and inadequate research on the role of community health nurses, we sought to investigate the effects of in-person and distance exercise training on the outcomes of knee injury and osteoarthritis in the elderly with limited literacy living in Mashhad, Iran.

Methods

This study was a two-group randomized clinical trial with a pretest-posttest design. The context of the study included two public parks from two municipal districts selected through convenience and purposive sampling methods, which consisted of a larger population of older adults. To allocate the parks randomly to two groups of conventional in-person and distance training exercises, their names were written on papers and then put inside a bag. Accordingly, the first draw from the bag was the place for in-person intervention and the remaining paper was chosen as the context for the distance intervention. In this respect, Laleh Park Cultural Center and Seniors Foundation of Koohsangi, Mashhad, Iran, were considered for the In-person and Distance groups, respectively.

Since the dependent variables in this study (three dimensions of knee injury and osteoarthritis, i.e., clinical symptoms and joint stiffness, pain, and functioning and daily activities) were of quantitative type with a distance scale, the sample size was estimated using the formula for comparing two populations means and via the findings of Akbarnejad et al. (22) (mean and standard deviation parameters in the two study groups were respectively 26.93±9.0 and 16.79±9.1) at the 95% confidence level and 80% test power using 13 elderly individuals in each group. Predicting possible sample loss, the sample size for this study was considered equal to 30 for each group (60 elderlies).

The inclusion criteria in this study were the age of 60 years and older, primary education or limited literacy, vision, speech, and hearing to the extent that the individuals were able to participate in the study, scores below 55 on the Western Ontario and McMaster Universities (WOMAC) as the questionnaire measuring knee injury and osteoarthritis as self-reported by patients in three dimensions of clinical symptoms and joint stiffness, pain, and functioning and daily activities, infliction with osteoarthritis of grade 2 or 3 based on the grading system developed by Kellgren-Lawrence and according to a radiologist's interpretation, scores less than 12 on the 15-item Geriatric Depression Scale, no delirium or psychotic disorders, no consumption of antidepressants, cognitive ability of over 8, no knee joint replacement surgery, as well as no hospital admission during the past three months.

The exclusion criteria in this study were unwillingness to continue the study, infliction with acute diseases over the last week, non-attendance in more than two sessions, and occurrence of new physical impairments preventing the elderly to participate in the training sessions.

Demographic characteristics checklist and the WOMAC were also completed in the form of self-report by the elderly or even by the researcher if required. The original version of this questionnaire was designed in 1982 by Bellamy et al. to examine pain, joint stiffness, and physical functioning of patients with hip and knee osteoarthritis. This research instrument is comprised of 24 items that are divided into three subscales of pain (5 items), joint stiffness (2 items), and physical functioning and daily activities (17 items) (33). In its latest version, the subscale of clinical symptoms (5 items) and four other items were added to the subscale of pain in the questionnaire, thus, the new version of the questionnaire consisted of 33 items.

The highest possible raw score in the subscale of pain is 36, and such values are 28 and 68 for the subscales of clinical symptoms and functioning and daily activities, respectively. The score of each item was within the range of 0-4. The total raw score of each subscale was placed in the relevant formula; in fact, the score was converted into a number within the range of 0-100. According to this final score, obtaining higher scores indicated fewer problems and symptoms (34). In order to compute the score of each dimension in the range of 0-100, the raw score of each dimension was firstly multiplied by 100 and then divided by its total score, and finally, deducted from 100.

Ebrahimzadeh et al. in 2013 confirmed the validity of the WOMAC using the Knee Injury and Osteoarthritis Outcome Score (KOOS), which was significantly correlated with $P<0.0001$ and the Short-Form Health Survey (SF-36; $P<0.005$) associated with quality of life. Its correlation was also proven. The correlation coefficients between the WOMAC and the KOOS regarding joint stiffness,

pain, and physical functioning were reported at -0.559, -0.842, and -0.894, respectively.

The reliability of this questionnaire in Iran was evaluated in a study on 169 patients with knee osteoarthritis visiting the clinic of Ghaem Hospital affiliated to Mashhad University of Medical Sciences and its internal consistency was approved with Cronbach's alpha coefficient of 0.917 (35).

Given that the WOMAC consists of different dimensions and its items are in the form of multiple-choice options, the reliability of this research instrument in this study was established through internal consistency; in this case, the outcomes of knee osteoarthritis in 10 elderly people were measured at one time by the researchers. Then, the Cronbach's alpha coefficients for each of the dimensions of clinical symptoms and joint stiffness, pain, and physical functioning and daily activities, as well as total score were estimated at 0.74 , 0.81 , 0.77, and 0.84, respectively.

A rheumatologist or a specialist in physiotherapy and rehabilitation examined the elderly subjects. Afterwards, they were given a letter of introduction to obtain the radiographs in posterior, anterior, and lateral views along with the address of the X-ray center with which a contract was signed. Radiography was performed from the knees of the elderly individuals. All the radiographs were then examined by a radiologist and rated based on the Kellgren-Lawrence criteria, and the status of each view was reported. After preparing the graph report, the researcher received them. Following that, radiological symptoms were examined by a radiologist, and the older adults whose reports were the cases of osteoarthritis grade 2 or 3 based on the mentioned criteria in one or two joints were entered into the study.

The content of the training courses included concise description of knee osteoarthritis, two stretching exercises, and three strength exercises appropriate for the level of the limited-literacy elderly. The contents were prepared in collaboration with the research team, specialists in physiotherapy and rehabilitation, as well as a rheumatologist and using scientific resources. The same educational contents were received by the Distance group, where the materials were distributed in the form of 30 booklets with short and simple sentences accompanied by a multimedia educational CD produced in collaboration with Islamic Republic of Iran Broadcasting (IRIB) along with a colorful illustrated booklet with short and simple sentences for the elderly.

In the In-person training group, the participants were selected from the elderly visiting Laleh Park Cultural Center and meeting the inclusion criteria of the study until reaching the determined sample size. Two stretching exercises (36) and three strength exercises (37) suitable for the elderly with low levels of literacy were taught and supervised by the researcher and trained by a physical medicine and rehabilitation. The In-person group consisted of three groups of 10 people, who received the training during eight 30-minute sessions two days a week in the Fanavari and Rasaneh Foundation in Laleh Park Cultural Center. At the end of the training period, the exercises continued for two months at home by the elderly. During this period, the subjects were reminded of doing the exercises three times a week by the researcher through phone calls. The researchers also collected self-reports provided by the elderly individuals or a close relative or a family member who cooperated with the researcher.

In the Distance group, the participants were selected from the older adults visiting the Seniors Foundation of Koohsangi and meeting the inclusion criteria of the study until reaching the calculated sample size. The same educational contents were taught to this group in the form of a booklet illustrated with simple sentences and accompanied by a multimedia educational CD. The ways to do and repeat the exercises were similar to those in the In-person training group.

Considering sample loss (three individuals in the In-person group and four in the Distance group), the study continued until reaching the sample size that was equal to 30 individuals in each group.

At the end of two months, the knee condition was re-examined using the WOMAC in both groups and the obtained results were compared with those of the pre-intervention stage.

All the ethical codes approved by the Deputy of Research at Mashhad University of Medical Sciences related to the subjects of the study were observed. These codes included obtaining permission from the Ethics Committee, acquiring permit from the authorities of the School of Nursing and Midwifery, receiving an official letter of introduction from the authorities of the School of Nursing and Midwifery to be submitted to Mashhad Municipality officials, the Municipal Cultural Organization, and the Health Center in Mashhad Province, adhering to the principle of confidentiality to ensure the elderly about their data and presentation of the results in a general format, obtaining informed consent from the older adults to participate in the study, explaining the research procedure, and allowing the

participants to withdraw from the study at any time they desired.
Analysis of the data was conducted using SPSS, version 16. To this end, the distribution of the quantitative variables of this study was firstly determined through the Kolmogorov-Smirnov test and Shapiro-Wilk test. To investigate the homogeneity of the two study groups in terms of confounding and underlying variables, Chi-square test, independent t-test, and Mann-Whitney U test were used. For inter-group comparisons, the scores of the WOMAC dimensions obtained from the independent t-test (or its equivalent parametric test, i.e., Mann-Whitney U test) were employed. Moreover, paired t-test (or its equivalent parametric test, i.e., Wilcoxon signed-rank test) was used for intra-group comparisons.

Results

The mean ages of the In-person and Distance groups calculated using the Mann-Whitney test were 68.2±5.6 and 69.2±9.4 years, respectively. The mean body mass index (BMI) values measured through the independent t-test were 29.7±6.1 and 29.4±5.2 kg/m^2 in the In-person and Distance groups, respectively. In terms of gender, 76.7% and 63.3% of the participants in the In-person and Distance training groups were female. Chi-square test also revealed that gender differences in both study groups were not significant (P=0.26; Table 1).
The results illustrated in Table 2 using the independent t-test, Mann-Whitney U test, and paired t-test showed that both groups were not significantly different in terms of the scores of the clinical symptoms and joint stiffness dimension prior to the intervention (P=0.35). Following the intervention, both groups significantly improved in this respect (P≤0.001). However, the recovery rate of the elderly in the In-person group was significantly higher than that in the Distance group (P=0.04). The means suggested an ascending trend in the mean scores of clinical symptoms and joint stiffness in the elderly individuals, which were 9.0±5.4 in the In-person group and 4.6±2.1 in the Distance group. Meanwhile, earning higher scores indicated fewer problems and symptoms in patients.

Table 1. Means and standard deviations of age and body mass index in older adults with limited literacy in both In-person and Distance groups

Variable	In-person group	Distance group	Test results
	Mean±standard deviation	Mean±standard deviation	
Age (year)	68.2±5.6	69.2±9.4	*P=0.11
Body mass index	29.7±6.1	29.4±5.2	**P=0.89
Gender	Frequency (percentage)	Frequency (percentage)	
Male	7 (23.3)	11 (36.7)	***P=0.26
Female	23 (76.7)	19 (63.3)	

* Mann-Whitney U test ** Independent t-test *** Chi-square test

The results of the Mann-Whitney U test and Wilcoxon signed-rank test also indicated that the two groups were not significantly different in terms pain dimension scores at the pre-intervention stage (P=0.32). Following the intervention, both study groups witnessed significant improvements in this sub-scale (P≤0.001); however, the recovery rate in the older adults assigned to the In-person group was significantly higher than that in the Distance group (P=0.04), such that the mean scores of pain demonstrated a rise in the elderly in the In-person and Distance groups, which were calculated 11.6±6.4 and 5.2±1.3, respectively. Moreover, obtaining higher scores showed lower pain (Table 2).
Further, the findings of the Mann-Whitney U test and Wilcoxon signed-rank test revealed that the two study groups were not significantly different in terms of functioning and daily activities dimension scores before the intervention (P=0.60). At the post-intervention stage, both study groups showed significant improvements in this sub-scale (P≤0.001); nonetheless, the recovery rate in the In-person group was significantly higher than that in the Distance group (P=0.04), such that the mean scores of functioning and daily activities increased in older adults in the In-person and Distance training groups, which were equal to 11.6±6.4 and 5.2±1.3, respectively. Furthermore, obtaining higher scores indicated lower number of functioning problems (Table 2).
Finally, the results of the Mann-Whitney U test and Wilcoxon signed-rank test revealed that the two

study groups did not have any significant differences in terms of their total scores prior to the

Table 2. Means and standard deviations of outcomes of knee injury and osteoarthritis before and after the intervention in limited-literacy older adults in both In-person and Distance groups

Outcomes of knee injury and osteoarthritis		In-person group Mean±standard deviation	Distance group Mean±standard deviation	Inter-group test results
Score of clinical symptoms and joint stiffness	Before intervention	59.7±12.1	58.9±19.3	*P=0.35
	After intervention	68.7±15.2	63.5±16.2	*P=0.43
	Pre-/post-intervention difference	9.5±0.4	4.6±2.1	**P=0.04
	Intra-group test results	***P<0.001	***P<0.001	
Pain score	Before intervention	47.1±12.3	48.4±15.2	**P=0.32
	After intervention	59.0±12.8	54.1±13.0	**P=0.02
	Pre-/post-intervention difference	11.9±8.6	5.7±2.1	**P=0.03
	Intra-group test results	****P<0.001	****P<0.001	
Score of functioning and daily activities	Before intervention	53.0±20.6	53.2±15.7	**P=0.60
	After intervention	64.6±15.7	58.4±15.2	**P=0.04
	Pre-/post-intervention difference	11.6±6.4	5.2±1.3	**P=0.01
	Intra-group test results	****P<0.001	****P<0.001	
Total score	Before intervention	44.0±12.6	45.1±13.1	**P=0.52
	After intervention	57.8±12.2	50.0±12.5	**P=0.02
	Pre-/post-intervention difference	13.8±14.0	5.0±2.6	**P=0.003
	Intra-group test results	****P<0.001	****P=0.007	

*independent t-test **Mann-Whitney U test ***paired t-test ****Wilcoxon signed-rank test

intervention (P=0.52). After the intervention, both study groups improved significantly in this regard (P≤0.001); nevertheless, the recovery rate in the elderly assigned to the In-person group was significantly higher than that in the Distance group (P=0.02), such that the mean scores of functioning and daily activities presented a rising trend in the In-person and Distance groups (13.8±14.0 and 5.0±2.6, respectively). Besides, obtaining higher scores suggested lower number of functioning problems (Table 2).

Discussion

In this study, we sought to compare the effects of two types of training, namely in-person and distance methods, on the outcomes of knee injury and osteoarthritis among the elderly with limited literacy living in the city of Mashhad, Iran.

The results of this study indicated that both in-person and distance training methods had significant impacts on the outcomes of knee injury and osteoarthritis in the older adults with low levels of literacy in the dimensions of clinical symptoms and joint stiffness, pain, functioning and daily activities, and generally on the WOMAC scores. However, the effect of in-person training was significantly higher than that of distance training.

In this regard, Mehrabian et al. (2013) in a quasi-experimental study with the aim of assessing the impact of aquatic exercises on knee osteoarthritis of 12 elderly and retired women from Teacher Training University in Iran found no significant difference between the pre-/post-test scores of clinical symptoms (18), which was not consistent with the results of the present study, where the given subscale significantly improved in both groups.

Moreover, a systematic and meta-analytic study by Anvar et al. conducted in 2015 using 16 articles meeting their inclusion criteria revealed that 10 cases showed recovery in the three dimensions of the WOMAC when examining the effect of training exercises among individuals with knee osteoarthritis by health personnel in clinics, in hospitals, and at home (32). This finding was in line with the present results. Our findings were also in agreement with the results of the investigations by Deyle et al. and Rogers et al. (2015)(32). In the same vein, Mortazavi et al., in 2016-2017, in a quasi-experimental study entitled as “the effectiveness of self-management education on the disability of elderly patients with knee osteoarthritis referring to Shiraz Geriatric Care Clinic after eight weeks” showed that self-management education could significantly diminish pain and improve its resulting disability in older adults (30).

O’Relly et al. (2015) in a study on at-home osteoarthritis training and control groups also found that

the score of the pain subscale and the total score of the WOMAC reduced compared with those in the control group, while the score of the pain subscale in the control group had decreased and the WOMAC score had remained unchanged. The results of that study in the At-home training group were consistent with the findings of the Distance training group in the present study considering the pain dimension (32).

The possible reasons for the differences in the findings of this study could be attributed to the variations in some of the research characteristics such as the study populations, type of protocols, duration of exercises, teaching methods, inclusion criteria, post-intervention examination times, research instruments, as well as investigations into the subscales of the WOMAC.

One of the limitations of the present study was the self-reports provided by the elderly concerning the on time implementation of the exercises, which could affect our results and was out of the researcher's control. Future studies are recommended to use other training methods with longer follow-up periods focused on the quality of life in older adults.

Implications for Practice

Considering the beneficial effects of exercises, the ease of training and performing workouts, their safety, no need for equipment, and the possibility of doing the exercises at any place, as well as the prevalence of knee osteoarthritis, strength and stretching exercises can be considered as an effective and useful intervention for the elderly and patients suffering from knee osteoarthritis. The given exercises can also be incorporated into health promotion programs in health centers targeting older adults. The results of this study can be employed in the promotion of knowledge in nurses, community health practitioners, and geriatric nurses, as well as improvement of performance and quality of life of the elderly.

Acknowledgments

This article was the result of a Master's thesis in Community Health Nursing with the ethics code of 950714 submitted to Mashhad University of Medical Sciences and approved and registered with the clinical trial code of IRCT2017052027741N4. We wish to thank the professors and authorities of Mashhad University of Medical Sciences, Provincial Health Center, Community Health Center No. 3, Shahid Beheshti Healthcare Center, and Seniors Foundation of Koohsangi, Mashhad Municipality, as well as all the elderly and respected individuals who collaborated with this study.

Conflicts of Interest

None declared.

References

1. Hosseini SR, Zabihi A, Savadkouhi S, Bizhani A. Prevalence of chronic diseases in elderly population in Amirkola (2006-2007). J Babol Univ Med Sci. 2008;10(2):68-75.
2. Salehi L, Selki S, Alizadeh L. Evaluation of health-related quality of life in elderly members of Tehran's senior hospitals in 2009. Iran J Epidemiol. 2012;8(1):14-20 (Persian).
3. Khosravi A, Alizadeh M, Torkashvand M, Aghaei N. Population ageing in Iran. Tehran, Iran: United Nations Population Fund in Iran; 2014.
4. Pourtaghi F, Emami Moghadam Z, Ramezani M, Behnam Vashani H, Mohajer S. Effect of resistance training using Thera-band on muscular strength and quality of life among the elderly. Evid Based Care. 2017;7(3):7-16.
5. Aemi SZ, Dadgar S, Pourtaghi F, Askari Hoseini Z, Emami Moghadam Z. The effect of exercise program using elastic band in improving the old women's health. Iran J Obstet Gynecol Infertil. 2015;18(177):20-5 (Persian).
6. Kooshyar H, Shoorvazi M, Dalir Z, Hosseini M. Health literacy and its relationship with medical adherence and health-related quality of life in diabetic community-residing elderly. J Mazandaran Univ Med Sci. 2014;23(1):134-43 (Persian).
7. Population and housing census. Statistical Center of Iran. Available at: URL: https://www.amar.org.ir; 2016.
8. Sari N, Kooshiar H, Vaghee S, Kamelnia H. Elderly's quality of life and related factors

among nursing home residents in Mashhad, 2013. J Mazandaran Univ Med Sci. 2014; 23 (1) :243-252
9. Peiman H, Yaghoubi M, Seyed Mohammadi A, Delpishe A. The prevalence of chronic illnesses in elderly people in Ilam. Elderly Sci Res J. 2012;6(4):7-13 (Persian).
10. Maghsoudi A, Abedi K, Hope F, Faezeh S, Mohammadi Z, Riahi S. The study of prevalence of chronic diseases and its association with quality of life in the elderly of Ewaz (South of Fars province), 2014. Navid Nouve J. 2016;18(61):35-42.
11. Malekzadeh M, Ghasemi B, Mirnasuri R. Effect of aquatic exercises on the motor performance and the quality of life in patients with knee joint osteoarthritis. Med J Hormozgan Univ. 2014;18(3):211-8.
12. Arthritis (osteoarthritis). Iranian Rheumatology Association. Available at: URL: www.iranianra.ir; 2010.
13. Vaghee S, Sepehrikia M, Saghebi SA, Behnam Voshani H, Salarhaji A, Nakhaee Moghaddam Z. Comparison of the Effect of Face-to-Face and Multimedia Education on the Anxiety Caused by Electroconvulsive Therapy in Patients with Mood Disorders. Evidence Based Care. 2017:1;7(1):25-34.
14. Zendehboodi M, Behzadni B, Mazarei E. Comparison of the effect of hydrotherapy and physiotherapy methods in rate of kneeahce matinal dryness, daily activities, athletic performance, and recreation activities in athletes men with knee osteoarthritis. J Appl Life Sci Sport. 2013;1(2):95-109 (Persian).
15. Nejati P, Farzinmehr A, Moradi-Lakeh M. The effect of exercise therapy on knee osteoarthritis: A randomized clinical trial. Med J Islam Repub Iran. 2015;29:186.
16. Ahadi T, Saleki M, Razi M, Raeisi G, Forough B. Comparison of physical modality and knee isometric exercise training on symptom of knee osteoarthritis. J Gorgan Univ Med Sci. 2011;12(4):12-7 (Persian).
17. Jokar M. Exercise therapy in Rheumatic diseases. Mashhad: Mashhad University of Medical Sciences; 2010.
18. Mehrabian H, Shojaedin SS, Baratii AH, Ghasemi M. Effects of aquatic exercise on the pain, symptoms, motor performance and quality of life of elderly women with knee osteoarthritis. J Rehabilitat Sci. 2012;8(2):337-45.
19. Etesami AS, Zamani J, Zolaktaf V, Ghasemi G. Effectiveness of aquatic exercise therapy on the quality of life in women with knee osteoarthritis. Iran J Ageing. 2015;10(3):62-71 (Persian).
20. Heidary A, Mazlom R, Ildarabadi E. Nursing position in health care delivery system in Iran. Iran J Nurs Res. 2012;7(25):37-44.
21. Senior Corycoleum community health nursing. High Council for Medical Planning. Available at: URL: http://nursing.tbzmed.ac.ir; 2011.
22. Kabel A, Mazzier M, Russo J, Joy S. Health literacy challenges among older adult orthopaedic rehabilitation patients. Int J Health Sci Res. 2015;5(7):301-8.
23. Reisi M, Javadzade SH, Mostafavi F, Sharifirad G, Radjati F, Hasanzade A. Relationship between health literacy, health status, and healthy behaviors among older adults in Isfahan, Iran. J Educ Health Promot. 2012;1(1):31.
24. Lowe W, Ballinger C, Protheroe J, Lueddeke J, Nutbeam D, Armstrong R, et al. Effectiveness of musculoskeletal education interventions in people with low literacy levels: a systematic review. Arthrit Care Res. 2013;65(12):1976-85.
25. Baraz SH, Mohammadi E, Boroumand B. A comparative study on the effect of two methods of self-care education (direct and indirect) on quality of life and physical problems of hemodialysis patients. Arak Med Univ J. 2006;9(1):7-22 (Persian).
26. Borhanhpour F, Intelligence A. Guide to media selection and health education methods. Tehran: Arman Brana; 2011. P. 80.
27. Saif AA. Modern educational physiology of learning and instruction. Tehran: Doran; 2011 (Persian).
28. Rasouli D, Habibzadeh H, Safaei Z, Mohamadpour Y, Jafarizadeh H. Comparison of self-empowerment education through, training packages and training workshop on the

empowerment of diabetic patients in diabetes center, Urmia University of Medical Sciences, 2013. J Nurs Midwifery Facul. 2014;12(5):386-93 (Persian).
29. Abedi G, Naghibi A, Alizadeh M, Faghrzadeh H, Sharifi F, Rezaei Rad M, et al. Efficacy of the two educational methods: traditional and electronic techniques in training of nutritional aspect to healthy life style in elderly. Iran J Diabetes Metab. 2013;13(1):9-20 (Persian).
30. Mortazavi H, Pakniyat A, Ganji R, Armat MR, Tabatabaeichehr M, Saadati H. The effect of self-management education program on disability of elderly patients with knee osteoarthritis referring to elderly care clinic of Imam Reza (AS) treatment center in Shiraz, 2015-2106. J North Khorasan Univ Med Sci. 2017;8(3):461-70 (Persian).
31. McAlindon TE, Bannuru R, Sullivan MC, Arden NK, Berenbaum F, Bierma-Zeinstra S, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. Osteoarthrit Cartilage. 2014;22(3):363-88.
32. Anwer S, Alghadir A, Brismée JM. Effect of home exercise program in patients with knee osteoarthritis: A systematic review and meta-analysis. J Geriatr Phys Ther. 2016;39(1):38-48.
33. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The American College of Rheumatology (ACR). Available at: URL: https://www.rheumatology.org/I-Am-A/Rheumatologist/Research/Clinician-Researchers/Western-Ontario-McMaster-Universities-Osteoarthritis-Index-WOMAC; 2015.
34. Womac Score. Orthopedic. Available at: URL: ww.orthopaedicscores.com; 2016.
35. Ebrahimzadeh MH, Makhmalbaf H, Birjandinejad A, Keshtan FG, Hoseini HA, Mazloumi SM. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) in Persian speaking patients with knee osteoarthritis. Arch Bone Jt Surg. 2014;2(1):57-62.
36. Home exercise program for knee conditioning. Seattle Spine and Sports Medicine. Available at: URL: www.seattlespine.com; 2005.
37. Patient information factsheet-knee strengthening exercises. University Hospital Southampton NHS Foundation Trust (UHS). Available at: URL: www.uhs.nhs.uk; 2015.