Effect of Educational Program Based on Health Literacy Index on Self-Care Ability Among Older Adults: A Randomized Clinical Trial

Abstract

Background: Health literacy index (HLI) was developed to provide a proper framework for educational material in all levels. So, the aim of this study was to determine the effect of education based on (HLI) on the self-care ability among older adults. **Methods:** This randomized clinical trial was conducted with 68 older adults during the period of May–August 2019. The research setting was health centers in the south of Tehran, Iran. Samples were selected with considering the inclusion criteria. Then Block randomization was used to assign the participants into two groups. The intervention group for 4 weeks in groups of 8–10 in the intervention group. Self-care ability was measured using a self-care questionnaire in two stages, before and two months after the implementation of intervention. The control group received no education and only used the routine community house services. Statistical analyses were performed using the SPSS software (version 16.0). Data were analyzed using the Chi-square, Fisher's exact test and independent t-test. $P < 0.05$ was considered statistically significant. **Results:** The mean total self-care ability scores in the intervention group were 165.38 ± 10.69 and 184.28 ± 10.07 before and after intervention, respectively. These scores in the control group were 163.65 ± 13.27 and 167.52 ± 13.58, respectively ($P < 0.001$). The results showed significant differences between the two groups regarding self-care ability after the intervention ($P < 0.001$). **Conclusions:** The implementation of education based on HLI significantly improve the self-care behaviors in older adults. It is suggested that this approach should be established to fit of educational content appropriate to the age of the elderly in order to health promotion. Trial Registration: The trial was registered in the Iranian Registry of Clinical Trials on May 23, 2018, identifier: IRCT20170912036150N1.

Keywords: *Aging, education, health literacy, self-care*

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Introduction

The older adults are a diverse population group with unique considerations and needs.[1] Although population ageing indicates the success of public health policies and socio-economic development, it can also result in challenges for health care delivery in the society.[2] According to the WHO, the world's elderly population is expected to increase to 2 billion by 2050, which underlines their expectations and the need for support more than ever.[3] Entering old age is associated with several disorders and problems in different physical, mental, and social aspects.[4] On the other hand, elderly care is challenging and costly.[5] It is estimated that elderly care takes up two-thirds of the time of the nurses.[6]

From the perspective of the WHO, older adults need to acquire the necessary skills to support themselves and others and enjoy right decision-making and independence. They prefer to live in a place of their choice, which is possible if they are capable of self-care.[7] Self-care is defined as the required knowledge and its proper use to take care of oneself.[4] According to the Center for Disease Control and Prevention (CDC), health literacy is a requirement for effective self-care as well as communication and interaction with health care providers and centers.[8] Health literacy is defined as the degree to which individuals have the capacity to obtain, process, and understand the health information they need to make appropriate health decisions, including a constellation of reading, listening, analysis, and decision-making skills and applying these skills in health situations.[9,10]

According to the WHO, health literacy is one of the important determinants of health[9] that has a pivotal role in determining health inequalities.[11] Studies

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have shown that people with sufficient levels of health literacy participate more in treatment decision-making and pay more attention to their health literacy status.[12-14] On the other hand, the prevalence of health risk behaviors is higher in individuals with inadequate health literacy; moreover, these people have a weaker health status. In addition, they have worse chronic illness control, utilize more emergency department and hospital services, and have more problems with medication use.[11,15] These shortcomings are associated with great economic impacts and result in adverse outcomes like increased mortality rate.[16]

According to evidences, about half of the Iranian population has limited health literacy with the limitation being more prevalent in vulnerable groups, including the elderly.[12,17] To improve health literacy, it is very important that the educational content be comprehensible. In this regard, the CDC (2011) designed an instrument for educational content assessment. This instrument, which is known as the health literacy index (HLI), was developed by experts using a review of the literature and can provide a proper framework for health literacy education in all levels.[18,19]

The results of application of this instrument to develop a manual for prevention of falls for older adults showed that although not all the health information materials were appropriate for the audience and met their needs, it was possible to provide educational material according to the health literacy level using the HLI.[20] So, self-management education tailored to health literacy promotes medication adherence among older adults.[21]

Considering the inevitable sensory and perceptual changes in the elderly and their effects on their ability to read and understand health information, which is one of the reasons for the lower health literacy in this vulnerable group,[22] and because health literacy is an important determinant of the health outcomes and expenditures[15] with significant impacts on health inequalities,[11] it is very important to address health literacy in the older adults.[22] So, evidence highlights the importance of working to improve health care strategies for older adults with low health literacy.[15]

Nonetheless, despite the importance of health literacy in all age groups and its role in self-care and health promotion of the society, no study has investigated the use of education based on the HLI. Since the results of such studies can help health decision makers and authorities design more effective educational material, this study was conducted to determine the effect of education based on the HLI on the self-care ability in older adults.

Methods

Study design

This randomized clinical trial with a pre-post design was conducted during the period of May–August 2019.

Study participants

The research population was all old adults' dwellers (60 years and up) visiting health centers in the south of Tehran, Iran. The inclusion criteria were the ability to read and write; lack of self-reported visual, auditory, and cognitive impairment; lack of physical and movement limitation; and a health literacy score below of 50 in the Health Literacy of Iranian Adults (HELIA) questionnaire. The exclusion criteria were missing at least 2 consecutive educational sessions and development of acute mental or physical problems during the study.

The sample size was calculated using the sample size calculation formula for comparing two means. Considering a confidence level of 95%, test power of 80%, and a change of at least 0.25 in the mean score of self-care,[23] the sample size was calculated at 25.1 individuals (i.e., $n = 26$) in each group. Finally, 34 subjects were included in each group (68 participants in total) considering a lost-to-follow up of 30%.

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\bar{X}_1 - \bar{X}_2)^2}$$

Sixty-eight individuals were selected using the convenience method with considering the inclusion and exclusion criteria. The selected samples were randomly assigned to intervention and control groups using blocked randomization with a block size of 4 until the required sample size was achieved. The allocation sequence was generated using the online research randomizer (www.randomizer.org). For allocation concealment, numbered opaque envelopes were used. Subsequently, based on generated random sequence, card A (intervention) and B (control) were placed in an opaque envelope. Then, envelope 1 was opened for the first participant and his group was identified based on the card in the envelope. The same technique was repeated for each participant. Allocation concealment and sampling were performed by two independent persons so that the person who performed allocation concealment was not involved in sampling.

A total of 68 elderly people participated in the study. Of 68 participants, 5 subjects from the intervention group and 3 subjects from the control group withdrew from the study. Finally, data analysis was done in 60 subjects (Intervention ($n = 29$), Control ($n = 31$)) [Figure 1].

Measurements

The primary outcome in this study was self-care ability in older adults. The outcomes were measured at the beginning of the study and two months after the last interventional session. The data collection tools were the Health Literacy of Iranian Adults (HELIA) questionnaire (for screening of participants), a demographic questionnaire, and a self-care scale.
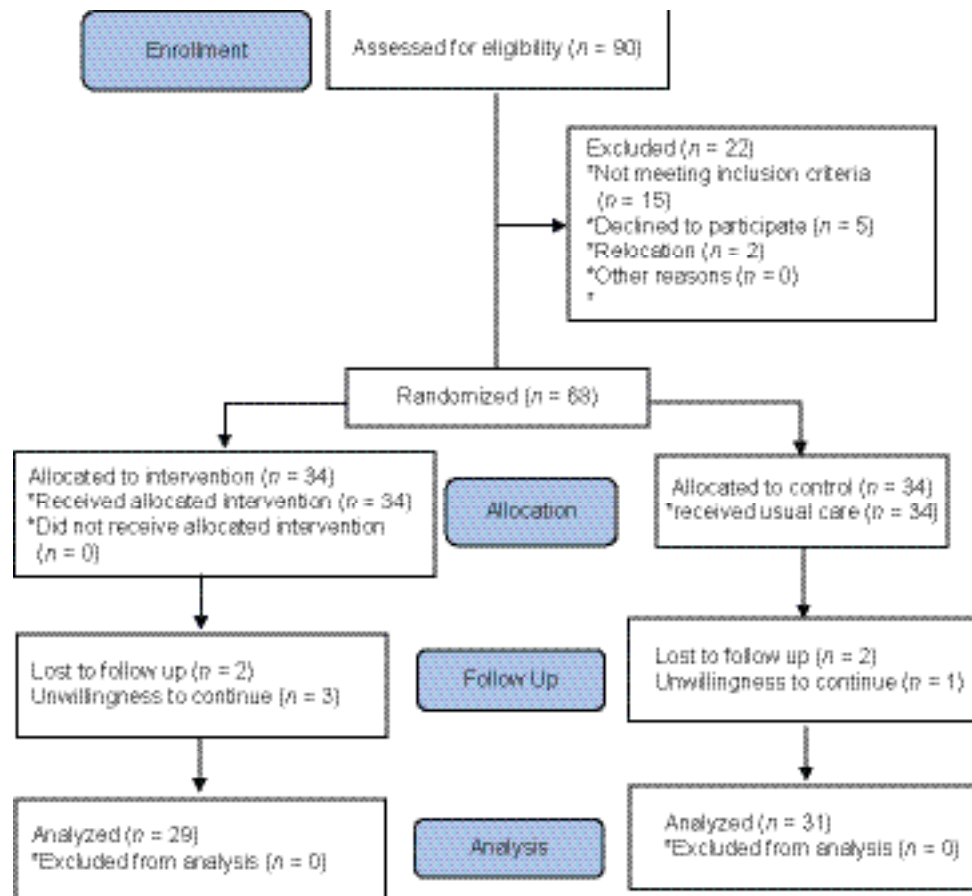
Figure 1: CONSORT Diagram

The HELIA was developed and psychometrically analyzed to measure the health literacy of Iranian adults. This questionnaire has 33 items organized in 5 domains of access (6 items), reading (4 items), understanding (7 items), appraisal (4 items), and decision-making and application of health information (12 items). The questions were answered based on a 5-point Likert scale from 1 (lowest score) to 5 (highest score). The score of each domain is calculated and then converted to a standard score ranging from 0 to 100. This questionnaire was applied in the beginning of the study and subjects who received a score of less than 50 were included in the study. The HELIA has an acceptable validity and reliability. Content validation has been done using the expert panel and exploratory factor analysis, 33 items were loaded indicating a 5-factor explained %53.2 of variance observed. Additional analysis for internal consistency showed satisfactory results with Cronbach's alpha coefficients ranging from 0.72 to 0.89.[17] Demographic questionnaire, this questionnaire was used to collect the data of age, sex, marital status, number of children, education level, occupation, income adequacy, height, weight, blood pressure, BMI, cigarette/alcohol/illicit drugs use, medical history, drug history, periodic tests and examinations, health information source(s), living place, living with family members or alone, and the house being on the first floor or upper floors.

The Self-care scale, this researcher-made scale was applied to measure five domains (58 items) of physical (20 items), mental (8 items), emotional (14 items), social (7 items), and spiritual (9 items) self-care in the older adults. The questions were answered based on a 5-point Likert scale from 1 (lowest score) to 5 (highest score), with an overall score ranging from 58 to 290. A higher score in the scale was indicated a more desirable self-care. This scale was designed using existing questionnaires, reviewing literatures and related studies and its psychometric assessment was performed. The reason for designing the scale was that the existing scales did not examine all aspects of self-care. Content and face validity was examined quantitatively and qualitatively. For this purpose, after obtaining the opinion of expert panel, the necessary corrections were made. In the measurement of the face validity of the scale, the ambiguous items according to the experts and some of the eligible older adults was changed. Content Validity Index (CVI) according to the experts was 0.92. The construct validity of the scale was assessed through convergence of the study scale and the health literacy of Iranian adults (HELIA). Given that the concept of self-care ability is significantly correlated with the concept of health literacy, the convergent validity of the scale was assessed through determining the correlation between the self-care ability

score and the health literacy score in adults. To determine the correlation between the mean HELIA score and the mean self-care ability score, both scales were distributed among the participants (n = 194). Then the correlation between the HELIA score and the self-care ability score was determined (r = 0.42 and P < 0.001).[24]

For reliability, the Cronbach's alpha coefficient of the physical, mental, emotional, social, and spiritual self-care was 0.883, 0.754, 0.887, 0.848, and 0.803, respectively. The ICC value of the above domains of self-care was 0.750–0.953, which was satisfactory and acceptable.

Before starting the intervention, the content of self-care in elderly was evaluated by six experts and nursing professionals to make sure they met the criteria of the HLI. HLI comprises 63 indicators organized in 10 criteria, including 1- plain language, 2- clear purpose, 3- supporting graphics, 4- user involvement, 5- skill-based learning, 6- audience appropriateness, 7- user instruction, 8- development details, 9- evaluation methods, and 10- strength of evidence.[18] Each criterion was scored with a yes / no answer. Finally, all scores of the experts were calculated. The scores given by six experts were 100, 90.62, 87.5, 85.6, 92.8 and 73.5, which was satisfactory and acceptable (All scores were above 60). Because if all scores are above 60, it indicates that the educational content is based on HLI.[20]

Intervention

After obtaining written informed consent, a pretest was first administered in both the groups.

Then, the educational sessions were held 4 session about 45–60 minute twice a week for 4 weeks in groups of 8–10 in the intervention group in community house in Tehran. All educational materials for all participants were provided by the same instructor. Intervention were information about five domains of self-care include physical, mental, emotional, social, and spiritual self-care in the older adults based on HLI. Educational methods were selected according to domain of self-care. As small groups were formed, group discussions and question and answer were conducted. Participants expressed their experiences and discussed their beliefs about their self-care. The control group received no education and only used the routine community house services. After intervention, Posttest was applied two months after the last interventional session. Conforming to research ethics, at the end of research, the participants of both groups were given an educational booklet about self-care in elderly.

Data analysis

For analysis of data, the normality of the quantitative variables was checked using the Kolmogorov-Smirnov test. All variables were normally distributed (P > 0.05). Descriptive statistics, including frequency distribution, mean, and standard deviation and inferential statistics, such as chi square, independent t test and Fisher's exact test, were applied to analyze the data. SPSS version 16 was used for data analysis. In this research, p values less than 0.05 were considered significant.

Results

The results showed that there were no significant differences in demographic characteristics between intervention and control groups and two groups were homogeneous [Tables 1 and 2].

Also, there was no significant differences in physical, mental, emotional, social, and spiritual self-care between the groups before the intervention (P > 0.05). However, a significant differences was observed in the scores of physical, mental, and social self-care between the two groups 8 weeks after education based on HLI (P < 0.05), while no significant differences was observed in the dimensions of emotional and spiritual self-care between the two groups after the intervention [Table 3]. Based on the main objective of the research, the results showed a significant difference in the self-care score between intervention and control groupsU after the intervention (P < 0.001) [Table 4].

Discussion

This study was conducted to evaluate the effect of education based on the HLI on the self-care ability of the elderly. The results showed a significant difference in the mean score of physical self-care between the two groups after the intervention.

In a study, researches conducted a study to develop a HLI for creating accessible and readable health information material for people of all literacy levels. The results showed that using the educational content by older adults and their feedback during the validation process helped develop an improved health literacy-based manual for prevention of falls. Moreover, the findings suggested that by presenting effective health information, older adults could play a more active role in their self-care.[20] In another study, self-management education based on health literacy promotes medication adherence among older adults.[21]

The results of the present study showed a significant difference in the mean score of mental self-care between the two groups after the intervention. Same study also found that self-care education improved the older adults' mental health.[25] There was no significant difference in the mean score of emotional self-care between the two groups after the intervention. The reason for the ineffectiveness of the educational intervention on this domain could be individual and cultural differences as well as differences in the mental state, perception of emotional self-care, and expectations from life. However, evidence showed the effectiveness of self-care education on physical, emotional, and mental health of patients.[26]

Table 1: Comparison of demographic variables in the intervention (*n*=29) and control (*n*=31) groups

Variables	Level	Control *n* (%)	Intervention *n* (%)	*P*
Age		64.81 (3.34)	65.55 (3.14)	0.37*
gender	Male	13 (41.9)	8 (27.6)	0.24**
	Female	18 (58.1)	21 (72.4)	
Married Status	Single	0 (0)	1 (3.4)	0.75***
	Married	23 (74.2)	20 (69.1)	
	Lone	8 (25.8)	8 (26.5)	
Educational Level	Under Diploma	23 (74.2)	18 (62.1)	0.49**
	Diploma	5 (16.1)	7 (20.7)	
	Upper Diploma	3 (9.7)	5 (17.2)	
Job	Employee	0 (0)	3 (10.3)	0.29***
	Housekeeper	13 (41.9)	9 (31.1)	
	Unemployed	2 (6.5)	1 (3.4)	
	Retired	16 (51.6)	16 (55.2)	
Income adequacy	Yes	12 (38.7)	7 (24.2)	0.07**
	No	5 (16.1)	10 (34.5)	
	Somewhat	14 (45.2)	12 (41.4)	
Living	Alone	22 (71)	24 (82.8)	0.21***
	With child	9 (29)	4 (13.8)	
	With caregivers	0 (0)	1 (3.4)	
Number of family members	0-2	10 (32.3)	9 (31)	0.94***
	2-4	14 (45.2)	12 (41.4)	
	>4	7 (22.6)	8 (27.6)	

*Independent *t*-test, **Chi-square, ***Fisher's exact test

Table 2: Comparison of demographic variables in the intervention (*n*=29) and control (*n*=31) groups

Variables	Level	Control *n* (%)	Intervention *n* (%)	*P*
Cigarette/ Alcohol use	Yes	11 (35.5)	4 (13.8)	0.53**
	No	20 (64.5)	25 (86.2)	
Medical History	Cardiovascular	12 (38.7)	10 (34.5)	0.84***
	Endocrine	9 (29)	8 (27.6)	
	Musculoskeletal	5 (16.1)	4 (13.8)	
	Digestive	3 (9.7)	2 (6.9)	
	Kidney	1 (3.3)	4 (13.8)	
	Other	1 (3.2)	1 (3.4)	
Drug History	Yes	31 (100)	27 (93.1)	0.22***
	No	0 (0)	2 (6.9)	
Periodic Tests	Yes	10 (32.3)	7 (24.1)	0.48**
	No	21 (67.7)	22 (75.9)	
Health information source	Family	6 (19.4)	2 (6.9)	0.37***
	Peer group	7 (22.6)	6 (20.7)	
	Media	18 (58)	21 (72.4)	
Health Literacy		32.4±2.5	29.7±1.4	0.42*

*Independent *t*-test, ** Chi-square, ***Fisher's exact test

Table 3: Comparison of the Mean±SD scores of the dimensions of self-care ability of elderly people in two groups (*n*=60)

Time/Groups Variable	Before Intervention Mean±SD		*P*	2 months After Intervention Mean±SD		*P*
	Control	Intervention		Control	Intervention	
Physical Self-Care	52.26±5.37	54.07±4.64	0.16*	53.48±6.1	62.28±4.99	0.001*
Mental Self-Care	21.41±1.64	21.24±1.74	0.68*	21.9±1.3	25.13±1.78	0.001*
Emotional Self-Care	42.77±2.82	43.10±2.51	0.63*	43.19±2.89	43.45±2.53	0.71*
Social Self-Care	18.45±2.41	18.93±2.12	0.41*	18.97±2.3	24.17±2.39	0.001*
Spiritual Self-Care	28.74±2.56	28.03±1.82	0.22*	29.96±3.18	29.24±2.02	0.3*

*Independent *t*-test

Table 4: Comparison of the Mean±SD scores of the self-care ability of elderly people in two groups (*n*=60)

Step/ Groups	Control, Mean±SD	Intervention, Mean±SD	Test
Before Intervention	163.65±13.27	165.38±10.69	*P*=0.58, Df=58, *t*=0.55
After Intervention	167.52±13.58	184.28±10.07	*P*=0.001*, Df=58, *t*=5.39

The results showed a significant difference in the mean score of social self-care between the two groups after the intervention. The results of a study showed that 60% of the patients with heart failure had low levels of health literacy. Furthermore, the low score of the social domain indicated the great impact of health literacy on social behaviors.[27] However, the results of a study showed no significant difference in the mean score of the social domain between the intervention and control groups after a self-care educational intervention,[28] which is inconsistent with the results of the present study. The researchers believe that this inconsistency is due to differences in study populations and the length of the intervention. In addition, individual and cultural differences as well as differences in their perception of the quality of life; and their expectations from life may have affected the results.

The results of this study showed no significant difference in the mean score of spiritual self-care between the two groups after the intervention. The reason for the ineffectiveness of the educational intervention on spiritual self-care could be differences in the attitude, perception of spiritual self-care and the physical and psychological state between older adults. Moreover, it is very difficult to change the attitude and beliefs of the older adults and therefore more serious interventions are required.

The health status of the elderly is to some extent determined by the circumstances in which they are born, grow and live. The findings suggest that addressing social issues faced by individuals at young age will go a long way to achieving good health in the future.[29] When the self-care ability diminishes in older adults, caregivers have to be aware of how this can be expressed and also be aware of their responsibility for identifying and mapping the needs for appropriate support and help, and preventing unnecessary and unwanted dependency.[30]

The limitation of the present study was the psychological status of the older adults which affected their response which tried to create the same conditions for all participants. Also, limited training sessions, performance of the study in a single center, and lack of follow up were some of the limitations of the current study. Thus, it is suggested that similar studies should be conducted in larger centers, with scheduled follow up periods and increased training sessions.

The results of this study can be used by researchers, especially gerontological nurses, as an efficient model for further theory-based research into self-care promotion and improvement. Development of educational contents based on HLI is an effective and evidence-based method to maintain and promote the health status and improve performance of older adults in all levels of self-care in the family and community. It is therefore suggested that before starting the intervention, the content of self-care in elderly was evaluated by experts and nursing professionals to make sure they met the criteria of the HLI. HLI provides a content with plain language, clear purpose, supporting graphics, user involvement, skill-based learning, audience appropriateness, user instruction, development details and strength of evidence.

Conclusions

In conclusion, the results of this study indicated that education based on the HLI improved the self-care ability and health promoting behaviors of the elderly. The Society needs healthy, active, and dynamic older adults. But, elderly is associated with major changes in various aspects of health. Therefore, it is necessary to provide conditions for the elderly to be able to self-care. So, it is suggested that community health providers can be used the HLI as a standard index to fit of educational content appropriate to the age of the elderly.

It is necessary that educational authorities in the field of health take the required measures to increase the knowledge of the older adults in different self-care domains to promote their health. It is suggested that the elderly utilize continuous educational programs based on the HLI to improve their self-care in order to promote their health.

Ethical approval

The Ethics Committee of Tehran University of Medical Sciences approved the study (ethics code: IR.TUMS.FNM.REC.3392) and the study was registered in the Iranian Registry of Clinical Trials (IRCT20170912036150N1). The participants were assured of the data confidentiality. Written informed consent was obtained from all participants prior to the study.

Conflicts of interest

There are no conflicts of interest.

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