Application of Freire’s Adult Education Model for Modifying the Psychological Constructs of Health Belief Model in Self-medication Behaviors of Elderly: a randomized controlled trial

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ABSTRACT

**Background:** As people age, they are more likely to engage in self-medication and suffer from its adverse effects. The present study aimed to modifying knowledge, psychological constructs of Health Belief Model (HBM), and self-medication behaviors using Freire’s Adult Education Model (FAEM) among elderlies in Khorramabad, Iran, from 2017 to 2018.

**Methods:** This research was of a prospective randomized controlled trial conducted on 132 elderly individuals older than 60 who were referred from health care centers. The participants were selected using multistage sampling method and randomly divided into two groups of intervention and control. The data collection instruments included a questionnaire which was designed based on both HBM and the self-medication behaviors questionnaires. The phases of the adult education approach were used to modify the psychological constructs of HBM and self-medication behaviors. Data were analyzed using SPSS software version 20 with a significance level of 0.05. Descriptive statistical tests, the chi-squared test, paired t-test, independent t-test, and univariate modeling were employed for this purpose.

**Results:** The mean age of the elderly was 66.28 ± 7.18 years. There was no significant difference between groups in terms of self-medicating. Unawareness of the effects of medicines were the most important causes of self-medication (p=0.50). The two groups were not significantly different in terms of knowledge, HBM constructs, and self-medication behaviors (p>0.05). However, they came up to be considerably different for the above variables after the intervention was completed (p<0.05). When the findings were adjusted for the effects of confounding variables, there were significant differences between almost all constructs of HBM and their behaviors (p < 0.05). However, the perceived barrier modality of HBM did not reach to a significant level of difference between two groups.

**Conclusion:** The educational intervention, which was based on FAEM, had positive effects on the constructs of HBM and consequently on self-medication behaviors. The psychological constructs of HBM were affected at the phases of listening to the problem and reflecting on it. Self-medication was tempered at the action-reflection phase with shared creation and evaluation of the action plan geared towards the achievement of the behavioral objectives. The results might be of importance for healthcare professionals involved in care of older patients.

**Keywords:** Elderlies, Freire's Adult Education Model, Health Belief Model, Self-medication

**Trial Registration:** IRCT2013091814512N2. Registered on January 2 - prospectively registered, http://www.irct.ir.
BACKGROUND
Self-medication, as the most common form of self-care, is defined as taking the commercially available medications. Some possible methods of getting hold of medications may include access to medicines without a prescription, using previously prescribed medications for similar cases, distributing prescribed medicines among family members and friends, and using the leftover medicines [1, 2]. In addition, refusing to comply with prescriber’s instructions by taking relatively high dose of a medicine or for long period of time, or even declining to complete the prescribed course of treatment can be considered under the same concept [3, 4]. Chronic diseases that mostly affect older people lead to pain, disability, decline in the quality of life, and increased need for medications. Additionally, aging by itself is associated with increased side effects of medications because body is not able to metabolize them as well as before [5]. Likewise, several studies suggest that the costs of treatment rise as people get older [3, 6]. Previous studies show complications of self-medication among elderlies can cause even more harms than good; therefore, it seems to be fundamental to identify such underlying behaviors and try to modify them so that the elderly can have a long and healthy life [7].

According to a systematic review, self-medicating has been increasing in rates in the Middle East [8]. The arbitrary drug use rate in Iran is about three times of the global average. As such, Iran is among the first 20 countries in the world where self-medication is extremely common, and has ranked second only after China [9]. Investigations indicate that each Iranian national takes averagely 339 tons of active substances annually, which is two to four times of world’s standard rate [10]. Although in most of the developing countries, there are access to medical treatment, WHO reports more than 50% of patients do not choose to go to a health care provider even if that seems to be necessary [11]. It is estimated that 83.3% of Iranians are currently using drugs arbitrarily [12]. In Iran, due to the pharmaceutical culture of the community and the relatively high prevalence of chronic disease, elderlies tend to use even greater amount of medications irrationally [3]. Elderlies are not able to metabolize substances as well as the young people. This may cause accumulation of medications in the body and therefore relatively high chance of over dosage of medicine or due toxicities among them [12]. This explains the challenges of arbitrary use of medicine among elderlies of developing countries specially when critical medications are available over the counter and each elderly has multiple medications in his or her pocket [13].

Researchers have used models to identify reasons for behavior changes. Health Belief Model (HBM) is considered a comprehensive and effective program which helps aim this goal. The main components of this model are based on psychological and behavioral theories. This model basically intends to identify and understand factors affecting behaviors as well as the way they may work. This model also offers ways to influence these factors under different circumstances [14]. Based on this model, if an individual are to change her behavior, she first have to believe that she is susceptible to a phenomenon, such as self-medication (perceived susceptibility); and understand the depth of this danger and adverse effects on her life (perceived severity). Subsequently, she should admit the benefits of behavioral changes, and stop using medication on her own (perceived benefits). Likewise, she should be able to overcome existing barriers to taking action, such as costs (perceived barriers). The fifth structure of the Health Belief Model is called action guides, which include accelerating forces that make one's need for self-medication. Such guides can be internal, such as understanding a physical state, external, like interpersonal interactions or media communication [15]. The efficacy of HBM in preventive health behavior has been confirmed in several studies [16-18].

Discussion and dialogs are among the cornerstones of changes in psychological behaviors [19]. Freire’s Adult Education Model (FAEM) is suggested to modify the psychological constructs of HBM. The essence of Freire’s model is dialog or skill acquisition through mutual communication. Freire’s model involves a three-phase process. In the first phase called Listening, the problem is set forth. In this phase, the various aspects of the issue are discussed with equal participation of all individuals. In the second phase called Reflection, emotional and social responses of individuals to the problem are emphasized. The last phase called Action-Reflection
involves the joint creation of an operational plan for behavioral changes and its joint assessment [14, 20]. So far, several studies have been done to eradicate the habit of self-medication [21, 22] but only few have been conducted to evaluate experience-based education to eliminate self-medication behavior among elderly people. The objective of the present study was modifying knowledge, psychological constructs of HBM, and self-medication behaviors using the adult education model among elderlies residing in Khorramabad, Iran, from February 2017 to April 2018.

METHODS
Study Design
This was a randomized controlled trial registered at the Iranian clinical trials system under the code of 2013091814512N2. The research was approved by the Ethics Committee of the Lorestan University of Medical Sciences, Khorramabad, Iran.

Participants
Participants were recruited from ten different health centers in Khorramabad, Iran, from February 2017 to April 2018. Out of the five postal districts in this town, health centers were randomly selected, so that individuals with different socioeconomic statuses were included in the study. The inclusion criteria consisted of having age older than 60 years, residing in Khorramabad, Iran, being mentally healthy according to the Iranian health record, and able to perform daily activities independently, and meeting the criteria for self-medication behaviors. Criteria for self-medication behaviors include use of at least a non-prescribed medication for a chronic or acute illness, non-compliance with physician’s order with respect to the prescribed medications such as raising or lowering of the drug dosage, taking the drug for longer or shorter than recommended period of time, refusing to complete the course of treatment, and failing to take the medication on a timely manner. The exclusion criteria included suffering from neurological defects, emigration, failure to participate in more than one training session, or having psychological health deficit.

Sampling and Procedures
The Multistage stratified and cluster sampling method was used for which the area of Khorramabad was divided into 5 strata of north, south, center, east, and west. In each geographical stratum, there were some urban health centers (clusters). From the clusters of each stratum, two were randomly selected by systematic random sampling. A total of ten health centers were selected out of the Khorramabad health centers. Finally, in each selected center, sampling was performed using the non-probability consecutive sampling method until the quota of each center was achieved. The sample size was determined by the formula for calculating the means. The primary sample size in each group (intervention and control) was calculated as 33 individuals using the following formula:

\[ n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2 (2s^2)}{d^2} \]

\( z_{1-\alpha/2} \): 97.5th percentile of the standard normal distribution corresponding to type I error probability of 0.05 =1.96
\( z_{1-\beta} \): 90th percentile of the standard normal distribution corresponding to test power of 0.90 =1.28
\( s \): an estimate of the standard deviation of total performance scores change in the both groups =1.26
\( \sigma_{change} = \sqrt{\sigma_{before}^2 + \sigma_{after}^2 - 2\rho \sigma_{before} \sigma_{after}} \sqrt{2^2 + 2^2 - 2 \times 0.8 \times 2 \times 2} \approx 1.26 \)
\( d \): the minimum mean difference of total performance scores change between the two groups, which is of great importance in the opinion of the researcher. Ultimately, because the cluster sampling method was used, the design effect was set as 2; therefore, the final sample size in each group was estimated to be 66.
Researchers contacted the elderlies through the contact information available in their records and asked them to appear at the assigned health centers for face-to-face interviews. After the interviews, 13 people were excluded from the study due to lack of self-treatment behavior and other entry criteria. Then, 7 people were excluded from the study due to lack of willingness to participate in the study and other reasons, such as migrating to another area. (figure 1)

After taking informed consents by a health care worker who was not involved in the recruitment of participants, the elderly were randomized into the control and intervention groups by permuted block randomization and a table of random numbers [23]. The elderly who met the criteria of self-medication behavior filled out the pre-test questionnaires. In February and March 2017, participants were contacted for face-to-face interviews and the eligibility of seniors was evaluated. In April, May and June 2017, the questionnaires were completed by both intervention and control groups. In July and August 2017, training sessions were held up. The participants in the intervention group received an educational intervention about the regular use of medications in addition to the routine integrated health care services for elderlies. Six months after the intervention was conducted, a researcher who was blinded to group allocation administered the follow-up questionnaires. Post-test questionnaires completed in March and April 2017.

**Intervention**
The intervention was carried out according to FAEM and included six 45-minute educational sessions. The number of training sessions was determined based on the work of Clark et al., which was performed on elderly population [24]. The adult learning process was implemented in the following three phases listed below.

**Listening Phase**
The facilitator raised the issue of self-medication by playing a video about elderly individuals suffering from liver and kidney complications due to self-medication. Brainstorming and subsequently a group discussion were held among the elderlies so that they got a chance to share their experiences regarding self-medication behaviors. This way, perceived susceptibility was applied. The elderlies were discussed the need for referring to physicians in the event of chronic or acute illnesses, and the necessity of refraining from obtaining medications from pharmacies without a prescription. They were also alerted against the use of herbal and traditional medicines without a physician’s prescription. Then, perceived severity was persuaded by presenting statistical information and a case study that emphasized the negative consequences of self-medication. The elderlies talked about the various complications associated with self-medication such as prolongation of the disease, increased costs of treating illnesses newly emerged as a result of self-medication, psychological and social burden of losing health such as reduced overall life satisfaction, and limited communication with friends and family.

**Reflection Phase**
In each group, the elderlies stated the presence of all potential barriers by brainstorming. They role-played about the barriers under discussion, and then a discussion was held up on the solution to the obstacles that were role-played. In this phase, some beliefs were brought up. Those include the idea that health is so important that some time and money should be put aside for visiting doctors, the treatment offered by doctors should be trusted, and that even if they experience severe pain and do not have access to a physician, they should not self-medicate. To modify the structure of perceived benefits, series instructions for taking medications such as proper dosage, timing, and course of treatment were discussed with individuals who had chronic illnesses. A discussion was subsequently played on benefits of refraining from self-medication, including medication safety and receiving quality treatment by medications prescribed by a physician. In the end of this phase, the elderlies expressed
their emotional and social concerns to self-medication behaviors. Eventually, the elderly individuals discussed how they can resolve this issue.

**Action-Reflection Phase**
The behavioral objectives of modifying self-medication behavior were set at this stage. According to these modifications, elderly individual should refrain from taking medications without the prescription of a physician. Likewise, elderly individual should abstain from prolonging or shortening the duration of treatment and complete the course of treatment. Elderly individuals should also avoid increasing or decreasing medication dosage. The elderlies were given recall cards reminding them for regular use of medications in most visible places, such as refrigerators. They read consumer medication information leaflets before taking medications and disposed expired medications. They also created a virtual group with their peers, family members, and health caregivers to monitor their regular use of drugs while share their experiences and educational materials. They also increased the number of authoritative sources such as materials by the Ministry of Health and from health caregivers by which they acquired knowledge on the correct use of medications. This way, the construct of the external cues to action was modified. Additionally, they properly paid attention to their general good health achieved like a result of regular use of drugs as an internal cue to action.

**Outcome Measures**
The HBM scale was used in a previous researcher’s study that was a descriptive study of self-medication in the elderly[18].
The primary outcome was increased knowledge and improved attitude towards self-medication, which were measured by a questionnaire assessing the participants’ knowledge and constructs of HBM at baseline and 6 months following the intervention.

Section One the instrument consist of ten 4-choice questions about the understanding of the elderly about self-medication (e.g. In which group is self-medication more dangerous? Change the question please). A right response obtained a score of 1 a wrong one got a score of 0.

Section Two comprise five items associated with perceived susceptibility (e.g. I may self-medicate when I am sick. Change the question please), five items on perceived severity (e.g. I think self-medication can lead to death in some cases. Change the question please), five items about perceived benefits (e.g. In my opinion, by refraining from self-medication, it is possible to stay safe from its adverse effects. Change the question please), and four items on perceived barriers (e.g. I can’t afford visiting a doctor. Change the question please). A total of 19 questions were prepared based on a 5-point Likert scale. The Strongly Agree option achieved a score of four, the Agree option was given a score of three, the neither Agree nor Disagree option received a score of two, the Disagree option attained a score of one, and the Strongly Disagree option received a score of 0. Two items on internal and external cues to action have been accounted in the form of frequency distributions.

Section Three included a 14-item checklist regarding the reasons for self-medication, which were answered with Yes or No response, and were reported in forms of frequency distributions. The HBM questionnaire had been used in studies by Karimi and Sharifirad performed on elderly so that the validity and reliability of the questionnaire was confirmed [25, 26]. The reliability of this instrument was assessed using Cronbach’s alpha in a pilot study conducted on 20 elderly individuals having similar characteristics to the objective group. The Cronbach’s alpha was 0.89 for the knowledge questions, and 0.84 for items related to the scopes of HBM.

The secondary outcome included a reduction in self-medication behaviors which was assessed at baseline and six months after the intervention. A questionnaire was used including a series of dimensions for the purpose of considering behavioral objectives, and measuring self-medication behaviors. The dimensions included
refraining from using medications without physicians’ prescriptions, refraining from prolonging or shortening the duration of treatment, refraining from increasing or decreasing dose, and the regular use of medications according to the assigned time for each. Each dimension was evaluated with two questions about chronic and acute illnesses. The options to each question measured the frequency of the said behavior from Never to More than four times.

Validity
Health Belief Model provided the hypothetical concept for the instrument improvement. We created a set of specific items for our study as advocated by the model. This is a highly accurate model that shows the relationship between health beliefs and behaviors. This model is particularly suited for prevention-based interventions as well as relatively short-term interventions to achieve detailed changes [27]. Validity of the instrument was assessed through the following method [28, 29].

Face Validity
Both qualitative and quantitative methods were practical for face validity. For the purpose of qualitative approach, 20 elderies were asked to evaluate each item for imprecision and complexity. In general, there were no problems in reading and understanding the items by elderies. The quantitative face validity was assessed through impact scoring. Impact score for each item was calculated as multiplying the importance of an item with its frequency. The impact scores of greater than 1.5 were considered suitable [30].

Content validity
An expert panel including 15 health educational variables such as statistics, epidemiology, gerontology, pharmacology and general medicine examined the content validity. The expert panel was asked to comment on the obligation and relevance of the items in order to calculate the Content Validity Ratio (CVR) and Content Validity Index (CVI). The necessity of an item was assessed using a three-point rating scale: (i) not essential, (ii) useful, but not essential, and (iii) essential. Following the experts’ review, the CVR for total scale was computed. According to Lawshe, if more than half of the panelists indicate that an item is essential, then that item is considered to have the least content validity. In this study, a CVR for the level equal or greater than 0.59 was considered satisfactory [31]. The CVI was rated by experts based on relevancy, simplicity, and clarity on a 4-point Likert scale [28].

Reliability
Internal consistency of the instrument was assessed by using Cronbach’s alpha coefficient [32]. Alpha values of equal or greater than 0.70 was thought satisfactory

Statistical Analysis
Stratification variables are presented as frequencies and percentages. They were compared by the chi-square test. Continuous variables are presented as means and standard deviations and tested by paired t-test after evaluating their normality. In order to reduce the effects of the confounding variables, a univariate modeling was used to generate two models. Those included an adjusted model based on the pre-intervention measurements, and a second adjusted model based on the pre-intervention measurements and all the demographic variables. Statistical analyses were performed using SPSS software version 20.0 (IBM) at the significant level of 0.05.
Ethical Considerations
This research project has been registered at the Research Committee of the Lorestan University of Medical Sciences with the registration number of 2040. It was reviewed and approved by the Ethics Committee of the Lorestan University of Medical Sciences. All the participants took part in this study voluntarily. Participants signed a consent form before participation. In order to observe the principles of ethics in research, the educational materials were also made available to the control group at the end of the study.
RESULTS
The Kolmogorov-Smirnov test showed the quantitative variables followed a normal distribution (P>0.05). In terms of demographic characteristics, there was no significant difference between the intervention and control groups (Table 1). There was no significant difference between two groups in terms of self-medication causes. Lack of adequate knowledge about the harmful effects of the drug was the most important cause of self-medication in both groups (Table 2). The mean score of knowledge, psychological constructs of health belief model and self-care behaviors significantly improved after intervention in the related group (Table 3).

Table 4 shows the results of univariate modeling in two models. In Model 1, univariate modeling showed that there were no significant differences between the intervention and control groups after eliminating the effects of pre-intervention measurements, except for the of behavior (P>0.001) and perceived benefits(P=0.002), respectively. Model 2 shows intervention measurement’s values as well as the demographic variables following adjustment. There are significant differences between the intervention and control groups in terms of all the examined variables as presented in Table 2.

Among participants, a number of 56 elderlies (42.4%) mentioned recall cards, 53(40.2%), of elderlies stated families and acquaintances, 14 elderlies (10.6%) declared physicians, and 6 elderlies (6.8%) pointed out television as the most important external cues to action. This adds up to 129 individuals, while three participants refused to talk about it. Likewise, a number of 94 elderlies (71.2%) acknowledged fear of being affected by the adverse effects of self-medication, 22 participants (16.7%) confirmed not believing in self-medication, and 16 (12.1%) individuals affirmed general good health as the most important internal cues to action that persuaded them to undertake preventive behaviors. This added up to 132 individuals.

DISCUSSION
The present study was conducted with the objective of modifying knowledge, psychological constructs of HBM, and self-medication behaviors using the adult education model. The results showed there is a significant difference between the intervention and control groups after the intervention, when the effects of the confounders such as demographic variables, knowledge, behaviors, and the constructs of HBM were controlled. According to the results of the final multivariate model, the educational intervention had significant impacts on self-medication behaviors. The application of HBM in combination with Freire’s adult educational model (FAEM) enhanced its effectiveness in the elderly. In a previous study, educational intervention in the framework of Freire’s educational model created favorable changes in the attitudes and eating disorders of the students [33]. The most important point in Freire’s model is the problem-posing technique. This approach is completely different from traditional educational methods. In Freire’s model, there are no pre-made solutions and individuals to look for and act upon solutions by considering different aspects of the problems [34].

According to previous studies on this topic, HBM affected behaviors through several factors. A study was designed using SMS wording on the basis of HBM to improve adherence to treatment in low-resource settings. The study showed that behaviors would change by SMS wording in which touches on themes of HBM is effective [35]. Moreover, in another trial that was conducted to reduce self-medication behaviors among hypertensive elderly people showed that a personal educational program designed to promote adherence to treatment through psychological constructs led to a change in intent; therefore, improved behaviors [36]. The findings of the present study are consistent with those of two other studies by Shamsi and Movahedi et al. at this point [37, 38].

The intervention included three different phases to complete. In the Listening Phase, the elderly encountered with subject of self-care through the strategies used in this phase which increased sensitivity and perceived severity toward the subject. It was observed that the majority of the participants in the intervention group came to believe that they were susceptible to the adverse effects of self-medication after the intervention. This finding
is consistent with the results of studies by previous researchers [39-41]. As long as an elderly finds herself more susceptible to a self-limited disease, she is more likely to take precautionary measures. According to previous studies, perceived severity was a predictor of self-medication behaviors among elderly [18, 42]. In the present study, the perceived severity of the elderly increased in terms of the extent of harm caused by the arbitrary use of the medications. Likewise, in a study conducted on pregnant women, the participants were considerably concerned about self-medication’s side effects during pregnancy, the consequent birth of an abnormal baby, and the emergence of domestic problems following an educational intervention [37].

In the end of the listening phase, the elderly’s knowledge about definition of self-medication, its adverse effects, organs susceptible to self-medication, correct method of keeping medications, and recognizing expired drugs all significantly increased. According to the previous studies, mutual learning with feedback from learners is more effective and enduring. In fact, good knowledge is a predictor of positive attitude. While a reverse relationship was found between knowledge and performance of the elderly [8]. This issue also emphasizes the need for retraining programs for physicians and pharmacists, so that physicians can put more effort into educating elderly about proper use of medications [43]. In our study, inadequate knowledge about the harmful effects of medications was the most important reason for self-medication in both intervention and control groups. In line with the current study, a systematic review showed that most patients do not have enough knowledge about active agents, the methods of taking medications, and medications’ side effects. While, 60% of the patients do not read consumer medicine information leaflets enclosed within the drug packaging [8].

The second phase called Reflection was about finding an answer to the question of how elderly people can explain the situation and take control of it. In this phase, the costs of and barriers to performing the behaviors and possible solutions to overcoming it were discussed by brainstorming. In this way, the constructs of perceived barriers and benefits were modified. As such, perceived barriers were found as predictor of self-medication behaviors among elderly. According to a meta-analytic study by Carpenter, it was generally suggested that the construct of perceived barriers in HBM is an important factor to prevent or avoid unhealthy behaviors [44]. The construct of perceived barriers refers to beliefs about the actual and feasible costs of pursuing the regular use of drugs which declined after intervention in the intervention group.

It seems studies of construct of perceived barriers have yielded conflicting results [37, 38, 45]. This can be attributed to the variety of perceived barriers such as financial, physical, psychological, and social barriers, as well as different effects of educational interventions on modifying these barriers [46]. According to the univariate modeling, when the effects of demographic variables were taken into the account the impact of educational intervention on perceived barriers did not look to be significant.

From the other hand, it was believed that the construct of perceived benefits increased the relative efficacy of known methods available to the elderly for preventing self-medication after the intervention. Indeed, understanding the proper use of medicines can reduce the due adverse effects and help quick recovery from certain diseases which can be effective in improving perceived benefits. This finding was similar to that of the study by Shamsi which was conducted on pregnant women in Arak, Iran[37]. However, in the study by Movahedi, no significant changes occurred following the intervention [38]. This could be due to long term adverse effects of unhealthy behaviors which were intangible for the students participating in the study.

In the Action-Reflection phase, behavioral goals were set to modify self-medication behaviors. After the educational intervention, self-medication behaviors were significantly eliminated in the intervention group compared to the control group. The proper behavior of the drug usage was the final result of the intervention using the conceptual framework of adult education. According to previous studies, behavioral habits such as regular use of medications in accordance with physicians’ prescriptions were influenced the development of these behaviors [36, 48]. Recall cards were the most important guide for the elderly’s action on the correct use of medications. In a previous study to reduce accidents, installation of labels containing messages against the drivers’ eyes was the best method of information delivery. Family members, friends and health care providers
have been considered in other studies with different titles such as role models or mental health as the most important health promoting people. As a result the participants acted intelligently with regard to medication use and shared their experiences with friends, family members, and caregivers in virtual groups in order to help monitor their regular use of drugs.

The first highlight of the conceptual framework of Freer's adult education used in this study is to establish a two-way communication between the elderly. Since the discussion on the issue is the essence of this approach, it is also called collaborative research. The second highlight of the methodology of this conceptual framework is problematic or problem design. Students who are elderly people should search for solutions themselves and implement those to an action plan. Nonetheless, this study had a limitation as well. The self-medication questionnaire was a self-report questionnaire. Given that the adult education approach has been used in a limited number of studies, the discussion of the results are limited in scope. Therefore, it was attempted to compare and discuss the results of close studies.

CONCLUSION
It seems that the framework of FAEM was suitable for modifying the psychological construct of HBM with regard to self-medication behaviors among the elderlies. The constructs of perceived susceptibility and perceived severity were trained by subjecting the aspects of the issue of self-medication to discussion. The construct of perceived benefits and barriers were trained by discussing possible solutions and the benefits of using these solutions. In the end, the elderly used the drugs intelligently by creating and evaluating a joint action plan geared towards the behavioral objectives. The training of health personnel is recommended in order to apply the adult education framework to comprehensive health centers and nursing care centers in order to improve health behaviors such as adherence to treatment and proper drug use.

Abbreviations
HBM: Health Belief Model
FAEM: Freire's Adult Education Model

DECLARATIONS
Ethics approval and consent to participate
The Ethics Committee of the Lorestan University of Medical Sciences approved the study protocol with the approval number IR.Lums.REC 2040. Informed consent was obtained from the elderlies. Consent to participate was verbal. Because the studied topic was not sensitive and that the information obtained in the study did not entail adverse social and individual consequences, the Ethics Committee approved that obtaining verbal consents of the participants was adequate.

Consent to Publish: Not applicable
Availability of Data and Materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests
All authors have read and approved the content of the article. The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. Marzieh Araban is a member of the editorial board of the journal of Public Health.
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Author’s Contribution
KB and FB have made substantial contributions to the conception and design. MA and FE participated in the study design and data acquisition. MA, FB and AA were involved in drafting and revising the manuscript, which was critically for important intellectual content.

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Statement
The present study adheres to CONSORT guidelines and a completed CONSORT checklist has been included as an additional file when was submitting the manuscript.

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