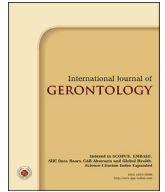




Contents lists available at ScienceDirect

International Journal of Gerontology

journal homepage: www.ijge-online.com

Original Article

A Theoretically Based Behavioral Nutrition Intervention for Elderly Women: A Cluster Randomized Controlled Trial

Jamileh Amirzadeh Iranagh^{a*}, Seyedeh Ameneh Motalebi^b, Fatemeh Mohammadi^b^a Faculty of Health, Urmia University of Medical Sciences, Urmia, Iran, ^b Faculty of Nursing and Midwifery, Qazvin University of Medical Sciences, Qazvin, Iran

ARTICLE INFO

Article history:

Received 25 April 2017

Received in revised form

1 August 2017

Accepted 14 August 2017

Available online xxx

Keywords:

nutritional intervention,
elderly woman,
Health Belief Model

SUMMARY

Background: Nutritional behavior is one of the main criteria for determining health in the elderly. Health Belief Model (HBM) is most commonly used theory in the interventional programs. This study was aimed to determine efficacy of HBM-based nutritional educational intervention on knowledge, belief and behavior of the elderly women.

Methods: The sample of this randomized controlled trial study was 100 elderly women who attended to four health care centers of Urmia, Iran. Data were collected using self-administered questionnaire included demographic characteristics and some HBM constructs. The experiment group participated to HBM-based trainings classes twice per week for 12 weeks. The educational strategies were consisted of lecture, focus-group discussion, and video showing. The questionnaire was completed before and after 3 and 6 months intervention. Data were analyzed using two way repeated measure ANOVA at the significant level of $\alpha < 0.05$.

Results: The mean scores of benefit, severity, susceptibility, and self-efficacy were not different between the two groups before the educational training ($p > 0.05$). However, the aforementioned scores changed significantly between two group after 3 months intervention and follow-up ($p < 0.001$). Furthermore, intervention group improved significantly on HBM constructs through three times measurements ($p < 0.001$).

Conclusion: This study confirms the effectiveness of HBM-based nutritional education on healthy nutritional perception, belief and behavior among elderly women.

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1. Introduction

Population ageing has become a challenge for both developed and developing countries¹. The rapid changes in the number of aged people create important concern, particularly in relation to the health of seniors². Ageing is associated with reduction in both physiological and psychological function³ that may lead to a significant level of dependency⁴. The incidence of age-related diseases has largely increased over time⁵. So, most patients admitted into the hospitals are older adults and two-thirds of them have two or more chronic illnesses⁶.

The adoption of lifestyle behaviors such as smoking, poor nutrition, physical inactivity has resulted in higher levels of risk

factors for non-communicable diseases (NCDs).⁷ Elderly population are more prone to NCDs.⁸ Studies showed that these diseases highly overcome in Iranian elderly⁹ and its prevalence in elderly women are more than men¹⁰. Burden of NCDs and the role of socio-demographic and behavioral predictors among these group of population need to be investigated in detail⁸.

The hazardous effects of behavioral and nutritional risk factors on NCDs have been established in the cohort and randomized trials studies^{11,12}. Health educational program can help older people to adopt healthy lifestyle behaviors and prevent and control age-related diseases¹³. To change the behavior, however, it is essential to understand and apply the widely used models to predict healthy behavior. Older people have limited knowledge about health threatening behaviors¹⁴. In this line, various studies have used the educational models such as Health Belief Model (HBM), planned behavior and social cognition theory¹⁵. HBM model was applied much more than other models for behavioral changes and

* Corresponding author.

E-mail address: Jamileh.Amirzadeh@gmail.com (J. Amirzadeh Iranagh).<http://dx.doi.org/10.1016/j.ijge.2017.08.007>1873-9598/Copyright © 2017, Taiwan Society of Geriatric Emergency & Critical Care Medicine. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

prevention of diseases^{16,17}. Hence, the HBM was used as the framework of this study to explain effective factors to change nutritional behavior (perceived severity, perceived susceptibility, perceived benefit, perceived barrier, and self-efficacy) of the elderly women.

2. Material and methods

This study was approved by the Ethics Committee of Urmia medical Science University (P6/92/4/47647) as well as Universiti Putra Malaysia [UPM/TNCPI/RMC/1.4.18.1 (JKEUPM)/F1].

The sample of this randomized controlled trial study was 100 elderly women who attended primary health centers in the Urmia city from October 2013 to May 2014. This study included women aged 60 years and older who have been resident of Urmia city at least for 5 years and were independent in basic activities of daily living. The volunteers with NCDs diagnosis or <6 scores on the abbreviated mental test scale were excluded from this study.

The elderly women were recruited using multi-stage cluster random sampling technique. First, Urmia was divided into four districts. Then, one health center was selected randomly from each district. A total of 200 elderly women were randomly selected from the list of all households under the cover of these four health care centers. A number of 100 out of 200 elderly women were qualified and interested to participate in this randomized controlled trial study. They were allocated into intervention ($n = 50$) or control ($n = 50$) groups randomly. The written consent was signed by the participants after informing about the aim, benefits and drawbacks of the study.

The following equation was used for determining the sample size.

$$n = \frac{(\sigma_1^2 + \sigma_2^2/\kappa)(Z_{1-\alpha/2} + Z_{1-\beta})^2}{\Delta^2}$$

$n1$ = sample size of Group 1, $n2$ = sample size of Group 2, $\sigma1$ = standard deviation of Group 1. $\sigma2$ = standard deviation of Group 2, Δ = difference in group means, κ = ratio = $n2/n1$. $Z_{1-\alpha/2}$ = two-sided Z value, $Z_{1-\beta}$ = power.

The sample size was estimated 38 subjects in intervention and 38 for control group. However, considering a 30% possible attrition rate, 50 participants were finalized for each group.

2.1. Data collection

Data were collected using a self-administered and validated questionnaire which was prepared for evaluation the nutrition behavioral change based on Health Belief Model among Iranian elderly^{18,19}. The questionnaire consisted of four parts. The first part was demographic characteristics such as age, marital status, employment, educational level, housing status and living arrangement. The second part was knowledge of healthy nutrition that was measured by 10 items. The third part consisted of 21 items to evaluate the respondent's nutrition behavior for all of food groups. Each item measured the number of servings of the various food per day. Each correct response was scored one point and a wrong response was given zero point. Then, the total score was computed. Finally, beliefs of the participants were measured using (24) items. A 4-point Likert scale, ranging from 0 to 4 (0 = completely disagree, 1 = disagree, 2 = I don't know, 3 = agree, and 4 = completely agree) was used to measure the beliefs including perceived susceptibility (4), perceived severity (5), perceived benefits (5), perceived barriers (5), perceived self-efficacy (5). The reliability of this questionnaire was checked and

Table 1
Result of reliability test on HBM scale for the nutrition questionnaire.

Variable	Number of items	Spearman's correlation	Cronbach's alpha
Nutritional knowledge	10	0.980	
Nutritional behavior	21	0.868	
Perceived benefit	5		0.894
Perceived barriers	5		0.827
Perceived severity	5		0.895
Perceived susceptibility	4		0.798
Self-efficacy	5		0.920

reported in Table 1. The questionnaire was completed by both groups before, at 3 and 6 months after the intervention program.

2.2. Intervention

The intervention group were trained in 24 sessions of 120 min each. Training sessions were conducted in groups of individuals and consisted of lecture, focus group discussion, question and answer, and showing video. The intervention group was provided pamphlets and educational booklet which were designed base on HBM to review the provided topics and to ensure educational continuity.

The intervention program was designed based on the components of the HBM for nutrition behavior improvement purpose. The program provided a blueprint for CVD prevention among elderly women. Therefore, the consideration of the program was improving the nutritional status and creating positive perception's changes of the elderly women.

The topics of the program's contents consisted of the importance of consumption of dairy products, meat and meat substitutes, fruits and vegetables, water and drinks, and reduction of consumption of salt for the elderly health promotion. Furthermore, the healthy nutritional behavior including non-using solid oils and using the alternative methods of cooking (steaming, boiling, and grilling) were explained. The recommendation of the lifestyle guidelines for Iranian elderly was used to instruct the subjects about consequences of unhealthy nutrition.

During the study, no educational program was implemented for the elderly women in the control group. However, for ethical consideration, the same educational program was provided for the control group at the end of the intervention program.

2.3. Data analysis

Data were analyzed using SPSS version 20 (SPSS® IBM, New York, U.S. A). Descriptive statistics were used to report the means (m) \pm standard deviations (SD) of the variable scores at three times measurements. Two way repeated measure ANOVA was used to detect mean differences between and within groups. The independent t -test was used to compare mean scores for the benefit, severity, susceptibility, and self-efficacy between the intervention and control groups before the intervention. All data were normally distributed using the Shapiro-Wilk test, Skewness, kurtosis, and histogram. Significance level was set at $\alpha < 0.05$.

3. Results

A total of 86 out of 100 elderly women (41 in the nutrition and 45 in the control group) completed six months' study program. Table 2 indicates the socio-demographic characteristics of the study subjects. As depicted in this Table, there was no significant

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