Educational Intervention Regarding Fruits and Vegetables Consumption among Elderly: Examinations of the stages of change construct

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Abstract: Improved nutritional status of elderly population has a significant impact on reducing the incidence of communicable diseases, mortality rate and increased functional capacities. Since the processes change theory is one of the important and applied theories in identifying and developing programs to promote healthy eating, this study was conducted with the aim to increase the consumption of fruit and vegetables using a curriculum based on processes change theory in elderly. This was a longitudinal randomized pre-test - post-test series control group design panel study. Overall, 80 60 years seniors and older participated in this study as intervention and control group. Data analysed by SPSS statistical package, version 20. Our result showed, after educational intervention, the mean knowledge score in the intervention group was significantly more than the comparison group ($p < 0.001$). The study results also showed that the individuals in the intervention group experienced higher processes regarding the consumption of fruits and vegetables so that compared with the time before the intervention, more subjects entered the stages of positive motivation (readiness) and doing target behavior. Although the findings of this study revealed that implementing the educational program based on change processes theory had positive impacts on promoting nutrition knowledge and stages of change in fruit and vegetable consumption, however, given the limited intervention in a small sample size, the generalization of the results should be taken with caution.
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1. Introduction

Increased life expectancy and have a longer life is not necessarily equivalent of successful aging; since the elderly is one of the most vulnerable groups of society, which should be considered in terms of social, health, and nutrition issues. Therefore, we must bear in mind that all human beings have the right to healthy aging (1). Many of the factors influencing the quality of life of elderly can be changed and intervened. Thus, adequate and scientific knowledge on influence rate of these factors in each community enables the appropriate interventions by authorities to enhance the quality of life for the elderly with minimum costs. Seeking for health determinants in seniors, it was found that improved lifestyle leads to increased survival and better health status in the elderly (2). One of the factors influencing the elderly lifestyle is their dietary behaviors and nutrition. Nutrition is an important topic in this group, which has been less considered in developing countries. According to studies, one of the major problems of the elderly includes inappropriate feeding and nutritional behaviors (3). Improved nutritional status in elderly population has a significant effect on reducing the incidence of communicable diseases, mortality and functional capacities (4). The results of some studies indicate that approximately 35% of cancers are associated with unhealthy dietary pattern (5). Studies have shown an inverse relation between fruits and vegetables consumption and cancer rates. Several studies have also shown the preventing role of fruits and vegetables consumption against cardiovascular diseases that considering the high rates of these diseases in the elderly, consumption of such is emphasized (6). Measures leading to improved eating behavior and the creation of a healthy dietary pattern will prevent the diseases; thus, nutritional issues are important. One of the most important ways to reduce the risk of chronic diseases is the consumption of 5 to 9 units of fruits and vegetables per day. The experts recommend that the elderly eat more fruits and vegetables that young people; but the seniors often take less than 5 units per day (7). A large proportion of chronic diseases affecting older people can be prevented or treated by improved nutrition, which highlights the importance of considering the nutritional status in elderly (8). In order to design an

appropriate nutritional intervention program, understanding the factors related to dietary choices such as nutrition knowledge, attitudes and skills is important (9). One of the most important causes of nutritional problems is lack of nutritional knowledge, resulting in unsatisfactory performance in this context, which causes problems such as malnutrition and the risk of developing different non-communicable diseases (10). The need to train elderly people to enable them to change their diet is obvious (11). The effectiveness of training depends on appropriate use of behavioral science theories (12). The change processes model is known as a method of identification of dietary changes (13). To develop effective interventions for seniors, understanding the relationship between stages of change model and other key variables such as perceived barriers and benefits is essential (7). The pattern of change processes emphasizes that the people are not similar in adopting a behavior, and are typically in five steps. Those in pre-thinking, thinking and preparation stages are considered inactive in terms of adopting healthy behaviors, while the people in operation and maintenance stages are considered active (14). Given that lack of public knowledge about nutrition is the most important obstacle in changing the eating habits (15), and since the health of the elderly is as society health priorities, designing and implementation of such an educational program for improving the nutritive behaviors of this class is essential. In other hand, several study reported, that comprehensive health promotion programs need to emphasize on psychological factors that mediate and predict health-related behaviors (16-21).
Therefore, this study was conducted to study the effect of education on knowledge, barriers, and stages of change associated with the consumption of fruit and vegetables in older adults in the city of Khorramabad.

2. Methods

This study was performed as a quasi-experimental pre-test - post-test study in two intervention and comparison groups in elderly aged 60 years and older in the city of Khorramabad. The sample size for each group was obtained at least as 32 subjects in each group that given the possibility of loss of samples, it was considered as 40 subjects in each group. The elderly names list was provided and numbered in two urban centers according to records of households. The samples were randomly selected from this list.

The first section of the questionnaire included 5 questions concerning personal and underlying information, involving the measurement of variables of age, sex, occupation, number of children, education level and number of household members, which were completed in the beginning of the study.

The second part included the measurement of change processes and individuals distribution in the stages defined as follows:

1. Pre-contemplation phase: The individual consumes less than 5 units per day of fruits and vegetables, and does not intend to increase his consumption.
2. Contemplation phase: The individual consumes less than 5 units per day of fruits and vegetables and thinks about increasing his intake in the next 6 months.
3. Preparation phase: The individual consumes less than 5 units per day of fruits and vegetables, but plans to increase his consumption to 5 or more in the next month.
4. Action phase: The individual consumes 5 units or more per day of fruits and vegetables, but has taken this attitude less than six months.
5. Maintenance phase: The individual consumes 5 units or more per day of fruits over 6 months.

The third part was related to knowledge measurement questions of people, including 10 questions about consuming fruits and vegetables with true - false answers that each true answer got 1 score, and each false answer was given a zero score. The Cronbach's alpha coefficient for the questions in this questionnaire was calculated as83% by pilot implementation.

The fourth part included questions about the perceived benefits and barriers. Answering the questions in this part was measured based on the degree of agreement of individuals using the five-degree Likert scale from perfectly agree (score 5) to totally disagree (score 1). In the following, seven questions were also asked about the consuming fruits and vegetables behavior.

Before designing the educational intervention program, the initial evaluation was first in the studied sample, and the content and number of educational sessions were determined based on initial assessment results. The time of sessions varied between 60 to 90 minutes based on the need and willingness of the participants. After the end of nutrition education program sessions, the post-test was conducted as follow-up assessment.

After data collection, data entry was done and analysis was performed using software SPSS 20 and appropriate statistical tests.

Educational intervention

The aim of implementing educational intervention based on change processes pattern is to develop and promote nutritional behaviors, and ultimately improve the life style of elderly. For educational intervention based on this theory structures, a combination of instructional strategies such as lecturing, question and answer, group discussion, team problem solving, and practical representation were used. The instructor had mostly a facilitator role in these meetings, and attempted to avoid the issue deviation from predetermined framework based on the preliminary assessment. The lecturer in Health Education, concluding in the end, numerated the benefits of adherence to a healthy diet with an emphasis on fruits and vegetables consumption, and described the ways to overcome the perceived disadvantages by providing useful and applied content about the processes to overcome the drawbacks. Fortunately, none of the participants were excluded from the study, and all 80 participants in the first part of the study completed the questionnaires again.

Table 1: Framework for educational intervention based on the stages of change model to improve nutritional behaviors in the elderly

Change processes	Objectives	Hypothesis	Strategy	Strategic keys to move to the next stage
Pre-contemplation	Determining the effect of an educational intervention actions based on increased knowledge and benefits of doing the behavior	Seniors informed of the benefits and constraints of doing the behavior are motivated to perform the behavior	Speeches, questions and answers, group discussion in small groups, face to face	Increased information, awareness and emotional acceptance
Contemplation	Determining the effect of an educational intervention based on the self-efficacy	Seniors receiving this education will gain the ability to discuss and analyze the obstacles	Speech, active participation, teamwork, problem-solving	Increased self-confidence and awareness of own abilities to adopt the recommended behavior
Preparation	Determining the effect of an educational intervention based on facilitating the decision making process	Seniors receiving this training will earn a proper recognition to make decisions	Lecturing, question and answer, practical demonstration, problem-solving and expressing the experiences	Resolving indecisions and stabilizing commitment and determining the action plan

3. Results

The independent t-test showed no significant differences between the two groups regarding the mean age, number of children as well as number of households. The Chi-square test showed no significant differences on frequency of distribution of gender between the two groups ($p = 0.65$). The Mann - Whitney test showed no significant difference on education levels between the two groups ($p = 0.313$). In general, intervention and control groups had similar demographic characteristics, and resulted changes after educational intervention were the result of intervention in the experimental group. The independent t-test showed that prior the intervention, the mean score of knowledge had no significant difference between the two groups, but after the intervention, the mean scores of knowledge in two intervention groups were significantly higher than the comparison group ($p < 0.001$).

Table 2: Mean knowledge score (out of 100) before and after intervention

	Intervention Group		Control Group		P-value
	Mean	SD	Mean	SD	
Before intervention	63.1	14.9	62.8	17.9	0.952
After intervention	83.3	10.9	64.1	14.3	0.001
P-value	0.001		0.55		

The paired t-test showed that in the comparison group, the mean score of knowledge in two times had no significant difference, but in the intervention group, after the intervention, the mean score of knowledge significantly increased (p <0.001).

Table 3: Mean scores of perceived barriers before and after intervention

	Intervention Group		Control Group		P-value
	Mean	SD	Mean	SD	
Before intervention	53.5	17.98	49.5	19.8	0.347
After intervention	40	10.8	49.75	18.7	0.006
P-value	0.001		0.72		

The independent t-test showed that before the intervention, the mean score of perceived barriers in two groups had no significant difference; but after the intervention, the mean score of perceived barriers in the intervention group was significantly lower than the comparison group (p <0.006); i.e., after the intervention, lower barriers appeared to consume fruits and vegetables, and the subjects learned ways to overcome the existing barriers.

The paired t-test showed that in the comparison group, the mean score of perceived barriers in two times had no significant difference, but in the intervention group, after the intervention, the mean score of perceived barriers significantly decreased (p <0.001).

Change processes of fruits and vegetables consumption

The Mann - Whitney test showed that the five stages before the intervention were not significantly different between the two groups. From the pre-contemplation stage individuals, 62% in the intervention group promoted to higher stages of contemplation, preparation and action through training. Before the intervention, only 7.5% of people were in the action stage that after the intervention, the rate rose to 40% (Table 4). The Mann - Whitney test suggests that after the intervention, the frequency distribution of different stages between the two groups was significant (p <0.001).

Table 4: Distribution difference of individuals in the change stages of consumption of fruit and vegetables (Comparison of pre-test and post-test)

	Pre- contemplation	**Contemplation/ Preparation**	**Operation / Maintenance**	**P-value**
Intervention group	25	11	4	P = 0.725
Control group	27	9	4	
Intervention group	0	23	17	P = 0.001
Control group	19	16	5	

4. Discussion

Healthy aging is the right of all human beings, and this emphasizes the importance of aging and preventing its problems (4). Gaining knowledge is as the most important expected outcomes in health education interventions (22). In the present study, the mean score of knowledge before the intervention was as 62%, which increased as 20% after the intervention. Wolf et al. study suggested a significant relationship between consumption of fruits and vegetables and level of relevant knowledge. It also mentioned a low understanding of barriers as an important factor in consumption (23). Yen's study also showed that with increasing age, the knowledge in relation to the general nutrition reduces (24, 25). In Sahyoun et al. study, nutritional interventions made from 1990 to 2003 for people over 55 were studied. Although the interventions were not successful in changing behavior, however, they were associated with certain features and some positive outcomes. Their findings suggest that successful intervention programs are those using the appropriate theoretical framework as a guideline in designing the training programs (26). In the present study, based on the stages of change regarding fruits and vegetables consumption, most of the subjects in the experimental group were in the pre-contemplation stage before the intervention, and only 10% were in the stages of action and maintenance. Following the educational intervention, the rate of subjects in the stages of action and maintenance increased to 42%. Glanz study also confirmed the positive impact of change processes model on improved nutrition status (27). Khezli et al. showed in their study that before the intervention, there was no significant difference between the two groups regarding demographic variables, knowledge score and stages of change in fruit and vegetable consumption. However, the mean score of knowledge in the intervention group increased at post-test, and stages of change for fruits and vegetables consumption also increased, and were pushed compared with before the intervention toward motivational (preparation) and more active (action) stages (14). For development of effective

interventions for seniors, understanding the relationship between the stages of change model and other key variables such as perceived benefits and barriers is essential (7). In this study, the mean score of perceived barriers before the intervention had no significant difference in two groups; but after the intervention, the mean score of perceived barriers in two intervention groups was significantly lower than the comparison group ($p < 0.006$). The change processes model emphasizes that individuals are not similar in adopting a behavior, and are generally in five stages. Those in the pre- contemplation, contemplation and preparation stages are considered inactive in terms of adopting healthy behaviors, while the people in operation and maintenance stages are considered active; Examining the people's perception of the problem, knowledge, attitudes and beliefs of individuals regarding the problem is very important. Also, informing individuals about the benefits of such a behavior as well as barriers to do the behavior matters (14). In general, studies based on the patterns of change processes are more effective in facilitating the behavior change compared to other studies. In other words, the interventions targeting the processes of change and having a specific curriculum for every step must have more positive results (28). Finckenor et al. showed in their study that the subjects in the intervention group increased their change stage mean significantly in the stage before the action and decreased their dietary fat intake, which lasted until one year after the intervention (29). This study was performed aimed to investigate the effect of education on knowledge, perceived barriers and change processes in relation with consumption of fruits and vegetables in seniors in the city of Khorramabad. It is suggested to study other structures of the change processes model, such as self-efficacy, balance of decision-making and change processes. One of the strengths of this study was using of a sample population similar to general population of elderly in Khorramabad. Limitations of this study included completing of a self-reported questionnaire and trusting the consumption rate of fruits and vegetables per day based on a short report. In addition, the scale used is based on virtual studies done in similar populations. Another limitation was the lack of consideration of economic conditions and inflation in the society.

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