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ORIGINAL ARTICLE

ASSESSMENT OF BASNEF MODEL TO IMPROVE NUTRITIONAL BEHAVIORS OF FAMILIES HAVING AN ELDERLY MEMBER: PSYCHOLOGICAL INTERVENTION

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ABSTRACT

Background: Education can improve nutritional behaviors of individuals. The aim of this study was to assess effects of nutritional health education based on the BASNEF model on nutritional behaviors of families with elderly members in Ilam, Iran.

Materials & Methods: The present research was conducted as an interventional study among 70 individuals (35 subjects for intervention and 35 for control groups) giving care to family members older than 60 years. The data collection tool in this study was a researcher-made questionnaire designed based on the BASNEF model measuring awareness, attitude, subjective norms, enabling factors and intent toward nutritional behaviors. Baseline and follow up information between interventions and controls were compared and the results were analyzed using SPSS version 22.

Results: The results of paired t-test revealed series of significant differences between score obtained at baseline and follow-up measurements within the intervention group for only 3 subscale of knowledge (p= 424.68, p= 0.001), attitude (t = 66.54, P = 0.001), as well as behavioral intention (t = 974.9., P= 0.001). The results of independent t-test showed series of significant differences between the two groups for 4 subscale of knowledge (t=0.399, p=0.001), attitude (t=90.78, p=0.000), enabling factor (t=0.09, p=0.02) and intention (t=110, p=0.000).

Conclusion: Our findings indicated that participating in educational programs can significantly increase level of knowledge, attitude, and behavioral intention about healthy nutritional behaviors. This study demonstrated the importance of receiving educational programs adopted from a model such as BASNEF in developing personal understanding of enabling factors to change the behavioral nutrition.

KEY WORDS: BASNEF Model; Behavioral Intention; Enabling Factors; Subjective Norms; Nutritional Attitude; Nutritional Knowledge; Nutritional Behaviors; Health Education.

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INTRODUCTION

Aging is defined as the lifelong process of growing cells and body organs at all levels and throughout life. According to the world health organization (WHO), many developed countries have accepted the age of 65 years as the cut off for elderly.[1-3] Nevertheless, this definition is arbitrary and often related to the age at which a person can receive a pension. The elderly age can be classified into three groups: 60-74 years (young elderly), 75-84 years (middle old), and over 85 years (old).[4-6] It has been estimated that by 2050, the world elderly population will reach more than 25%, which can bring us diseases related to nutritional problems. There has been a direct relationship between nutritional habits, health and mortality.[7-9] However, the changes that occur with aging may directly or indirectly affect the intake of foods and drinks. For example, olfactory

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and taste decrease, and digestive disorders simply appear. Inadequate food intake increases the risk of various disorders and decreases functionality. Therefore, it is very important to provide an appropriate nutritional condition for the elderly.[10,11]

Malnutrition is very common among hospitalized elderly, and it has been estimated as 30 to 50% depending on the patients 'characteristics and the diagnostic criteria. The prevalence of malnutrition is low (an incidence of about 2% and the risk of 24%) among the elderly living in the community.[12,13]

The prevalence of malnutrition among the Iranian elderly living at home is 9 to 10%, and its risk is at most 45%. Malnutrition is closely related to knowledge and associated with impaired performance, so it is very important to early diagnose this condition in malnourished and vulnerable individuals. Many nutritional screening and assessment tools are available to early diagnosis and treatment of this problem as well as reducing health care costs. An ideal nutritional assessment tool should be applicable, non-invasive, tolerable, cheap, executable at patients' bedside, sensitive, specific and deliver relatively rapid results.[14,15]

Although nutrition is an important issue in the elderly, according to the available evidence, this issue is neglected in developing countries. Nutritional education is an important component in health promotion and disease prevention programs. Various studies[12,13,16] have shown the effectiveness of educational interventions in promoting nutritional awareness and performance. The effectiveness of educational programs also depends on the correct use of theories and models of health education. Stronger theoretical basics and using more appropriate and frequent nutritional education programs will increase the effectiveness of these programs in changing and improving nutritional behaviors. Furthermore, selecting an appropriate theory and model is the first step in designing health educational interventions, including those related to upgrading nutritional behavior.[16]

In this regard, Eshaqi et al. (2010) in their study reported a relatively high prevalence of nutritional disorders in the elderly and recommended to perform more evaluations and introduce more appropriate programs to improve the nutritional status of the elderly. On the other hand, implementing interventions to prevent complications and premature death in the elderly also require assessing nutritional habits and various physical, psychological, social, and environmental factors affecting the consumption and selection of foods.[17] A health message should not only focus on avoiding certain foods, but also requires to clearly and practically provide nutritional guidance. In order to promote consuming fruits and vegetables, it is necessary to upgrade elders' awareness and pay attention to their economic problems. In fact, therapeutic and educational programs and nutritional interventions are essential for this group of the society. Studies have verified that a poor nutritional status not only increases the rate of hospitalization, but also increases its period, complications, as well as mortality which in turn, decreases the quality of life in the elderly.[18]

Nutritional status has an important role in the health and disease of elderly who often fail to stick to a proper diet. On the other hand, unhealthy nutritional behaviors are related to lifestyle, awareness, attitude, and motivational factors. For analyzing nutritional behaviors, it is necessary to exploit health education and promotion models, including the BASNEF model which is used to study behavior, design programs to change it, and determine the factors affecting people's behavioral decisions. In fact, this model is a starting point for analyzing a personalized behavior.

BASNEF model is one of the most complete hybrid models that is used to study and identify behavior and create new behaviors in society. According to this model, the most important factor determining a person's behavior is the person's intention that leads to the behavior. Intention is a combination of a person's attitude toward a behavior and mental norms. An individual's attitude is itself a combination of beliefs about the results of behavior and the value of the results of behavior. Mental norms are also a combination of normative belief and motivation for obedience. One of the important structures of this model is enabling factors. A person may want to perform the recommended behavior, but due to lack of skills, lack of resources required to perform the recommended behavior, or due to obstacles in the way of the desired behavior, the material cannot perform the desired behavior, and finally the person He gets hopeless from doing the behavior.[4]

As mentioned, nutritional status affects individuals' health and performance, and inadequate food intake with aging in addition to triggering nutritional deficiencies, accelerates the development of many elderly-related disorders which require a large volume of health and care services.[19]

So, the aim of this study is to assess the effects of nutritional health education based on the BASNEF model on the nutritional behaviors of families with elderly members in Ilam.

MATERIALS AND METHODS

This is an interventional study conducted among 70 members (35 as the interventions and 35 as the controls) of families with elderly members older than 60 years. We used multistage sampling

methods in this study. Initially, among 10 health centers across the city of Ilam, six were randomly recruited. The process of randomization in this step was simple random sampling from a pre-identified list of health centers that were recruited using a table of random number generation. Within the next step, list of eligible elderlies registered in each center were acquired. Using proportional allocation method, around 150 eligible samples were approached by a phone call and 70 people were randomly selected among eligible volunteer caregivers who met the inclusion criteria. Then samples were randomly divided into two groups of intervention and control after attending a briefing session. During this briefing session, respondents were given the necessary information about the aim of this study, potential benefits or risks and they were assured possibility for leaving the research at any stage without any serious consequences. Then a written consent form was signed by every respondent. Prior to data collection, researchers were provided with a written permission to attend in the selected health centers.

Participants' characteristics: We initially identified eligible elderlies and then applied our inclusion criteria to the main caregivers to be included in this study. The inclusion criteria for the elderly was caring for elderly age > 60 years old with no severe physical and psychological diseases recorded in their health profile. The inclusion criteria for the main caregiver was age of 20 to 50 years, willingness to participate, having the ability to read and write ,no severe physical and psychological diseases, as well as no history of participating in a similar research or educational classes during the past 6 months. Exclusion criteria included the hospitalization of the elderly or the caregiver during the study, missing the educational sessions (for the caregiver) and unwillingness to continue.

Sample size calculation: In the present study, the sample size was estimated based on the following formula Where, the values were considered as µ1=35.78, µ2=53.11, = 348.74, and = 303.81. These value are determined based on the study of Tavassoli and Hassanzadeh (2010).

Considering the first type error of 5% and the statistical power of 90%, the sample size was 35 for each group of intervention and controls.

Instruments: Demographic variables were measured in this study included questions about age, sex, education and height, illness, medication use as well as marital status. Our main data collection tool was a researcher-made questionnaire designed based on the BASNEF model including five subscales of awareness, attitude, subjective norms, enabling factors and behavioral intent. [20]

Study implementation process: After randomly selecting the members of the intervention group, the subjects of the control group were homogeneously selected (in terms of elder's income due to the important effect of this variable on nutritional status). The prepared questionnaire was distributed among the participants. On the first day, a 45-minute briefing session was held, and after this, four educational sessions (1-week apart) were held in a place prepared by the researcher. The educational content in these sessions was provided to the caregivers of the intervention group through various methods such as lectures, group discussions, questions and answers, educational videos and booklets by a nutritionist. At the end of the research, a booklet of the educational content was provided to the members of the intervention group. Phone calls (5 to 10 minutes talk to caregivers) were made in the weeks of one and three post-intervention to follow-up and emphasize on the role of the family in the implementing educated materials and to provide feedback.

No educational classes were held for the control group. The questionnaires were distributed among the members of the intervention and control groups again two weeks after the last session, and the data of the two groups were compared before and after the educational intervention (Table 1).

Statistical analysis:

Data were analyzed using SPSS software (v22) with a p-value less than 0.05 as an indicator for statistical significance. Descriptive statistics were computed for all variables, including means for continuous variables, frequencies for categorical variables, and standard error of the mean. The normality of data was assessed by Shapirovilix test. The analysis of covariance (due to advantages such as low intervention errors, high intervention control, the interpretability of experimental effects, and the abilities to adjust average values and estimating the missing data) was used to assess the research hypotheses. To meet the requirements of covariance analysis, the samples were randomly assigned to the study groups, and the homogeneity of variances was fulfilled. Also, in order to show the extent and direction of the influence of the intervention, the mean post-test scores of the main scales and subscales were calculated for the both groups. T-test was used to compare mean differences and Chi-square test was used to determine the frequency distributions in the groups.

Table1: Training sessions in the participants under study

Session	Time (minute)	Objective	A summary of topics and activity
1	45	Justifying of participants	Explain the design steps to the participants and motivate them to participate in the meetings Filling out questionnaires
2	45	Nutrition in the elderly	Special nutritional needs of the elderly Physiological changes in old age Malnutrition in the elderly Nutritional screening methods in the elderly (Lecture, group discussion, questions and answers, booklet, telephone follow-up)
3	45	Maintain weight stability in the elderly	Obese or overweight elderly Recommended for obese or overweight seniors Slim elderly Reasons for weight loss Diagnosis of malnutrition (Lecture, group discussion, questions and answers, booklet)
4	45	Nutritional interventions in the elderly	Methods of adding different types of cereal sprouts to food Ways to increase energy and protein intake in the elderly Nutritional recommendations in chronic patients Tips for physical activity (Lecture, group discussion, questions and answers, booklet, telephone follow-up)
5	45	Meeting to announce the end of the project	Filling out questionnaires Thanks and appreciation to the participants and staff of the health centers

RESULTS

This interventional study was performed on 70 elderly caregivers in Ilam city. The descriptive characteristics of the participants have been shown in Table 2. Slightly less than half of the participants (41.5%) had an age between 41 to 50 years (total mean age=46±1.65) while many of them (71.5%) had height of <175 cm, and 61.5% of participants had weight of <75 Kg (Table 2).

The subscales obtained from the questionnaire designed based on the BASNEF model were compared between the intervention and control groups before and after the educational intervention

Tables: 3 shows the average score for every subscale of the questionnaire used in this study. Paired t-test was conducted to compare mean score of every subscale in each group before and after educational program. These p values are presented in the rows under each subscale. Independents sample t-test was also conducted to compare mean of every subscale between cases and controls at both baseline and follow-up measurements. These p values are presented in the last columns of the table.

Table 2: The participants' demographic features

Variables	Subcategories	Total		
		N	%	p-value
Age (years)	<30	15	21.5	0.062
	30-40	26	37	
	41-50	29	41.5	
Gender	Male	26	37	0.058
	Female	44	63	
Marital status	Single	29	41.5	0.060
	Married	41	58.5	
Height (cm)	<175	50	71.5	0.032
	175-185	18	25.75	
	>185	2	2.75	
Weight (Kg)	<75	43	61.5	0.0421
	75-85	20	28.5	
	>85	7	10	

Table 3: Comparing the scores of different domains of health behaviors in the two studied groups.

Subscale			Interventions	Controls	t (independent t-test)	P value
	Before	Before	5.05 (2.02)	4.71 (2.2)	0.601	0.441
Knowledge	After	After	12.48 (0.65)	5.71 (2.2)	399.5	0.000*
T (paired t test)			424.68	0		
P value			0.001*	1		
	Before	Before	26.94 (5.52)	26.05 (5.19)	1.2	0.277
Attitude	After	After	35.17 (2.25)	26.05 (5.19)	90.78	0.000*
t			66.54	0		
p			0.001*	1		
	Before	Before	17.37 (3.18)	17.8 (4.26)	0.227	0.635
Subject: Norms	After	After	17.8 (4.26)	23.14 (5.57)	3.21	0.07
t			7.8	0		
p			0.07	1		
	Before	Before	23.88 (4.56)	23.11 (5.59)	0.399	0.530
Enabling Factor	After	After	26.68 (4.14)	23.14 (5.57)	0.09	0.004*
t			7.22	0		
p			0.09	0.983		
	Befor	Befor	85.26 (32.5)	27.6 (5.41)	0.261	0.611
Intention	After	After	91.35 (78.1)	82.26 (78.4)	110	0.000*
t			974.9	0.399		
p			**0.001***	0.53		

The results of paired t-test revealed series of significant differences between score obtained at baseline and follow-up measurements within the intervention group for subscale of knowledge (p= 424.68, p= 0.001), attitude (t = 66.54, P = 0.001), as well as behavioral intention (t = 974.9., P= 0.001). Nevertheless, these results showed no significant differences between mean score of subjective norm (t = 7.22., P = 0.007) and enabling factor (t = 7.22., P= 0.009) within the intervention group, before and after the study. Similarly, none of the mean differences were significant for the controls comparing the subscales' scores between baseline and follow-up. In other words, our study showed that educational program was only able to significantly promote caregivers' knowledge, attitude and their intention for nutritional behaviors.

The results of independent t-test intended to compare the mean score of every subscales between interventions and controls after the end of educational programs. These findings showed series of

significant differences between the two groups for subscale of knowledge (t=0.399, p=0.001), attitude (t=90.78, p=0.000), enabling factor (t=0.09, p=0.02) and intention (t=110, p=0.000). In other words, our study showed that educational program was able to significantly promote caregivers' knowledge, attitude, enabling factors and behavioral intention among those who received the intervention compared to those who did not.

The global score of nutritional behavior was not significantly different between the interventions (100.11) and controls (99.28) before implementing the educational program. However, the results of paired t-test showed a significant difference between pre- and post-education global scores in the interventions (t = 107.8, P= 0.001) but not the control group t=0.026, P = 0.871, (Table 4).

Table 4: The total score of nutritional behavior in the studied groups.

Time	Total nutritional behavior			
	Interventional group		Control group	
	Mean	SD	Mean	SD
Before education	100.11	14/49	99.28	1.93
After education	129.57	7.56	98.91	1.89
P-value	<0.001		0.871	

DISCUSSION

Chronic diseases play a decisive role in a person's health.[21-23] It is important to pay attention to the evaluation of the nutritional status of patients.[24-26] This study aimed to assess effect of education based on the BASNEF model on the nutritional behaviors among caregivers of elderly members. Our findings focused on the changes in five subscales including knowledge, attitude, subjective norms, enabling factors as well as behavior intention. The results showed that the intervention and control groups were homogeneous in terms of demographic characteristics before the educational program, thus the effects of demographic and background variables on the outcomes of the intervention were largely controlled.

Our findings indicated that caregivers' knowledge regarding nutritional behaviors improved after receiving educational intervention. On the other words, participating in educational programs can significantly increase level of knowledge about healthy nutritional behaviors. It should be highlighted that we confirmed the finding that level of knowledge can be promoted via educational programs in two analytical approaches. The first approach was to compare level of knowledge between those who participated in the educational program and those who did not. While, the second approach compared the level of knowledge among participants who received the educational programs at two measurements of baseline and follow-up. The results for both approaches were indicating the effective role of education on level of caregivers' knowledge toward nutritional behaviors. Our findings are consistent with previous researches[20,27,28], in which the interventions provided based on the BASNEF model have been effective in boosting participants' knowledge about nutritional behaviors. In addition, one of the important determinants in selecting an educational model is its effectiveness in promoting level of knowledge. As it was shown in the present study, BASNEF model is a successful experience for promoting knowledge among those who are in need of receiving information about nutritional habits.

Additional findings in this study were changing caregivers' attitude and intention toward nutritional behaviors by means of education. Similarly, as stated earlier we confirmed the finding that caregivers' attitude and intention can be enhanced via educational programs in two analytical approaches. The first approach was to compare attitude and intention between those who participated in the educational program and those who did not. While, the second approach compared the attitude and intention among participants who received the educational programs at two measurements of baseline and follow-up. The results for both approaches was indicating the effective role of education on caregivers' attitude and intention toward healthy nutritional behaviors. In contrast, we found no significant difference in the score of subjective norms neither in the intervention nor in the controls. This finding can be explained by the homogeneity of our participants in some demographic factors that are considered as enabling such as income. Nevertheless, it should be noted that although individuals' attitudes and subjective norms can affect their tendency for changing behavior, they should also be provided with enabling factors (i.e. income, health services, occupation, time, skills, etc.). Health educators need to consider variety of factors for enhancing behaviors and these include understanding belief, attitude, knowledge, health and social characteristics. Despite the challenging nature of changing behaviors, applying models such as what we examined here for BASNEF model may help educators to consider complexity of determinants in changing behaviors.

Interestingly, regarding our first analytical approach (as described above) we confirmed that those who participated in the educational program obtained significantly higher score of enabling factors rather than those who did not participated in the program at the end of the study. However, our second analytical approach revealed no significant difference in score of enabling factors before and after participating in the educational class. In other word, caregivers' who participated in the educational program had no improvement in enabling factors comparing themselves throughout the course of study. However, at the end of study caregivers who participated in the educational program showed positive remarkable improvement in perceived context of enabling factors compared to those who took no formal education. Enabling factors refer to sources and skills that drive

individuals will toward healthily changed in nutritional behaviors. Therefore, it should be concluded that our findings can explain the importance of receiving educational programs adopted from a model such as BASNEF in developing personal understanding of enabling factors to change the behavioral nutrition.

From the limitations of the present study were non-random allocation of the participants, relatively low number of the sessions, and the lack of possibility to change the enabling factors. In future studies, it is recommended to try to enable participants to change their behaviors through discussing and exchanging views. It is also recommended to utilize theory-based interventions (such as the model mentioned here) in health centers to correct lifestyle-related behaviors.

CONCLUSION

In general, considering that individuals' attitudes and their subjective norms are among preconditions for behavioral intentions, the BASNEF model can be applicable for changing health-related behaviors. Nevertheless, enabling factors (e.g. income, health services, employment, time, skills, etc.) must be provided to people in order to encourage them to change their behaviors.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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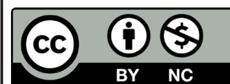
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	SS, SA
Acquisition, Analysis or Interpretation of Data:	SS, SA, DV, HS, HT
Manuscript Writing & Approval:	SS, SA, DV, HS, HT

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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