The impacts of Beliefs, Attitude, Subjective Norms, Enabling Factors-based educational program on cardiovascular risk factors through enhanced nutritional behaviors in water and wastewater organization employees

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ABSTRACT

Introduction: Cardiovascular disease is the main cause of disability and morbidity in many countries. Considering the significance of education in correcting unhealthy eating habits and improving nutritional behaviors that prevents cardiovascular diseases, the current study has been carried out to investigate the impacts of Beliefs, Attitude, Subjective Norms, Enabling Factors (BASNEF)-based educational program on the employees' nutritional behaviors. **Materials and Methods:** This study was carried out on 120 randomly selected employees of Water and Wastewater Organization of Kermanshah. Individuals were divided into the control and intervention groups. Questionnaires devised based on BASNEF model and food frequency questionnaires were collected preintervention and 3-month postintervention. Educational program was performed in four training sessions. **Results:** Significant differences between mean scores of knowledge and other items of BASNEF model as well as nutritional improvements were observed in the intervention group after 3 months ($P < 0.01$). **Conclusion:** BASNEF educational model positively affected nutritional behaviors of the employees to reducing cardiovascular risk factors.

Keywords: Beliefs, Attitude, Subjective Norms, Enabling Factors model, employees, nutritional behaviors

Introduction

Lifestyle is a combination of behavior patterns and personal habits in life which includes different aspects such as nutrition, exercise, stress, smoking, and sleep quality. Depending on nutrition type, the amount of exercise, and personal behavior, lifestyle may be healthy and brings about well-being and joy or unhealthy and leads to disease.[1]

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Meanwhile, the most common types of disease associated with unhealthy lifestyle, such as overweight, obesity, hypertension, type 2 diabetes, and dyslipidemia are the main causes of cardiovascular disease.[2] Cardiovascular disease account for 30% of morbidities in general and 80% of morbidities associated with noncommunicable diseases in the world.[2] Evidence show that between 2006 and 2015, 84 million US dollars in economic production are lost in 23 developing countries due to cardiovascular disease, stroke, and diabetes.[3] In 2008, 45%of

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morbidities in Iran caused by cardiovascular disease[3] which is the primary reason of deaths of + 35-year-old individuals.[4] Statistical studies conducted in Iran indicate that the major causes of deaths are cardiovascular disease, hypertension, overweight, inactivity, insufficient consumption of fruits and vegetables, and smoking.[4]

Cardiovascular disease account for 40% of mortalities in Kermanshah. From 2009 to 2011, 4100, 4118, and 4200 patients died from cardiovascular disease in this region, respectively.[5] According to the studies carried out during 2005–2007, more than 50% of people in Kermanshah are overweight or obese. In addition, <20% of people in Kermanshah have fruits and vegetables daily and <70% have seafood in a week, while more than 40% of people are inactive.[6]

Lack of knowledge is one of the major causes of adapting unhealthy lifestyle among organizational employees[7] and accordingly, improving healthy nutritional behaviors would be rational. It should be noted that the importance of educational programs depends on their level of effectiveness. In addition, the effectiveness of educational programs in changing individuals' habit depends on their practical support considering the basic health requirements.[8]

Among the educational behavior patterns that are devised basically for nutritional education, Beliefs, Attitude, Subjective Norms, Enabling Factors (BASNEF) model has some privilege. The model is proposed for the first time in 1993 where elements of reasoned action theory are combined with precede part of precede/proceed educational model. The BASNEF are challenged in this model.[9]

Several studies carried out based on this model indicate its effectiveness.[10-14] Benefits of this model are improved knowledge, attitude, and metabolic indices of aged patients with type 2 diabetes was shown by Najimi *et al.*[15] Moreover, promoted nutritional performances of students have been shown by Hazavehei *et al.*[11] the cesarean section rate among pregnant women in Khomain Country by Arefi *et al.*[16] and the selection of a contraceptive method in women by Sarayloo *et al.*[17]

According to our best knowledge, no research has been conducted to measure the effectiveness of educational programs in correcting healthy nutritional behaviors of employees using BASNEF model in the city of Kermanshah. Therefore, the current study was carried out to investigate the impacts of BASNEF-based educational intervention to correct nutritional behavior to reducing cardiovascular risk factors in Kermanshah Water and Wastewater Organization employees in 2015.

Materials and Methods

This study was a field trial consisting 120 employees of Water and Wastewater Organization of Kermanshah were selected from two departments as the intervention control groups.

The participants' age ranged from 30 to 45 years old, and they were similar in terms of job, education, and income levels. History of cardiovascular disease, diabetes, cancer, asthma, allergy, polycystic ovary dyslipidemia, pregnancy, lactating, taking vitamin and mineral supplements, aspirin, statins, contraceptives, metformin, and antidepressions were all considered as exclusion criteria.

After obtaining informed consents from all the participants, they were asked to complete the questionnaire designed based on BASNEF model. The questionnaire validity was measured by content-related validity and face validity evaluation methods. To do so, based on valid prepared sources and references and for the final examination of content validity, comments of five experienced professors, received either in person or by correspondence, were considered and applied in the questionnaire. The designed questionnaire was given to a number employees (homogeneous and nonparticipants) to obtain its face validity. Comments, questions, and notes pointed out by this group were also considered. The questionnaire reliability was measured by test-retest method for awareness and $r = 0.75$ was obtained. Questions and internal consistency of other items were evaluated by Cronbach Alpha in which $\alpha = 0.8$ was obtained. The other questionnaire used in this study to measure the effectiveness of employees' nutritional behavior was a validated food frequency questionnaire (FFQ).[18]

Then, an educational intervention performed in four training sessions, aimed at avoiding trans-fatty acids intake, using less saturated fat and simple carbohydrates, and increasing fruits, vegetables, and whole grains consumption while emphasizing on eating breakfast and healthy snacks at work. Educational contents delivered through making speech, question and answer sessions, and group discussion along with distribution of healthy snacks ended with giving prizes related to healthy diet. Considering behavioral attitudes and values attributed to possible outcomes, believable role models (those who were successful in following a healthy diet or losing weight) were invited to take part in training sessions and share their experience with the participants of the study. Regarding enabling factors and resources needed to perform a behavior, family support, nutrition counseling for each person, distributing clean vegetables in hygienic packs and healthy snacks at work were included in the program.

At the end of the training sessions, educational books and pamphlets were given to employees' family to involve them in interventions. Question and answer sessions, telephone follow-ups, and forming groups in social networks were performed in week 4 and 8 postintervention to emphasize the educational contents and the role of family and also to provide the answers for possible questions.

To observe research ethics code, the aforementioned contents were given to the control group at the end of the study. Follow-up investigations were carried out 3 months after training

intervention, and the individuals answered the questionnaires again.

After collecting data, statistical analysis was performed using SPSS software (IBM, Armonk, NY, United States of America). To examine the difference between nutritional patterns of the samples in the intervention and control groups, Chi-square test and difference between treatment groups at the beginning and the end of the study, marginal homogeneity test was used.

To analyze the differences of BASNEF items between control and treatment group, ANOVA test was used. Initial scores of the components are regarded as confounding variables. Education and age are also considered in this model.

Results

There were sixty participants in each group. Table 1 indicates the age and gender distribution of the participants.

As shown in Table 1, the two groups were not statistically significant in any of the demographic variables. At the end of the study and based on the FFQ questionnaire, the following food items indicated significant differences between the groups: Cake and cookie snacks, fresh fruits and fruit juice, salad, boiled vegetables, olive oil, red meat, visceral meat, fish and shrimp, and low-fat dairy. The results are given in Tables 2 and 3.

Consumption of cake and cookie, snacks, red meat, and visceral meat was reduced in intervention group ($P < 0.001$) while control group indicated no significant changes. At the end of the study, consumption of fruits, salad, boiled vegetables, olive oil, fish and shrimp, and low-fat dairies were increased in intervention group ($P < 0.001$). Other items of FFQ indicated no significant changes in the groups.

In intervention group, all BASNF components showed significant positive changes.

As shown in Table 4, at the end of the study, awareness, attitude, enabling factors, behavioral intention, and abstract norms were significantly different between the control and intervention groups.

Table 1: Age and gender distribution of participants			
Variables	Control group (%)	Intervention group (%)	*P*
Gender			
Male	56 (93)	43 (72)	0.76
Female	4 (7)	17 (28)	
Education			
Associate degree	7 (11)	8	0.63
BA	47 (79)	49 (81.6)	
MA and higher degrees	6 (10)	3 (5)	
Age	39.49±4.67	40.41±5.907	0.82
Work experience	17.57±7.07	16.48±7.52	0.13

Discussion

This study showed that after 3 months conducting the educational program based on BASENEF model, awareness score of the intervention group was significantly improved. The impact of educational model on the level of awareness is an important issue in selecting the educational model.[19] Hazaveii *et al.* indicated that educational intervention based on BASNEF model is more influential than classic educations in increasing the level of awareness[12] In fact, abstract norms and enabling factors in BASNEF model lead to increased awareness among intervention group.[15,20,21] Findings of our study are in the line with Hazavehei *et al.* in which the impact of BASNEF-based education model on nutritional effectiveness of students was assessed.[11] Furthermore, the model impact on nutritional behavior and glycemic indices among patients with diabetes in Najimi *et al.* study,[22] as well as other findings on BASNEF model obtained by other researches including Sharifirad *et al.*[8,19] and Hazavehei *et al.*[3,10,11] are in agreement with our results indicating this educational model can significantly increase employees awareness and hence, improve their lifestyle.

The score of attitude toward nutritional behaviors in intervention group was improved more than the controls. Education had the highest contribution on attitude of the participants in intervention group.

Although most studies have indicated the positive impact of education in improving attitude[15,17,23,24] however, changing attitude followed by educational intervention is not always possible. Rezai *et al.* found no significant differences between the control and intervention groups in type 2 diabetes patients' attitude toward nutritional diet.[25] It seems that theoretical educations and types of employed educational model play significant role in changing participants' attitude[15,26-28]

In the current study, considering behavioral attitudes and values attributed to possible outcomes, believable role models (those who were successful in following a healthy diet or losing weight) were invited to take part in training sessions. In addition, using different educational methods, making proper and more effective communication and interaction with participants, explaining new concepts of healthy nutrition within the framework of educational intervention led to improved employees' attitude as other similar studies have emphasized.[11,15]

Increased score of enabling factors in intervention group results from obtaining more knowledge, nutrition counseling for every person, supports from spouse, family, accessible resources, running healthy buffet at the workplace, distributing healthy snacks and clean vegetables package with valid health permit, holding contests and giving prizes, all are considered as effective factors in changing behaviors. While, due to lack of enabling factors in control group, no significant changes were witnessed in their scores. Many of the BASNEF-based studies have pointed

Table 2: Nutritional patterns of control and treatment group, before and after intervention						
Food	Before		P	After		P
	Intervention	Control		Intervention	Control	
Fresh fruit						
2 or more per day	9 (15)	21 (35)	0.06	10 (16.7)	45 (75)	<0.001
Once a day	31 (51.7)	23 (38.3)		31 (51.7)	13 (21.7)	
Several time per week	17 (28.3)	14 (23.3)		16 (26.7)	2 (3.3)	
1-4 times per month	3 (5)	2 (3.4)		3 (5)	0 (0)	
Control						0.9
Intervention						<0.001
Salad						
2 or more per day	4 (6.7)	4 (6.8)	0.494	4 (6.7)	31 (51.7)	<0.001
Once a day	10 (16.7)	16 (27.1)		10 (16.7)	19 (31.7)	
Several time per week	33 (55)	25 (42.4)		33 (55)	9 (15)	
1-4 times per month	13 (21.7)	14 (23.7)		13 (21.7)	1 (1.7)	
Control						0.9
Intervention						<0.001
Boiled vegetables						
1 or more per day	5 (8.3)	6 (10.3)	0.103	5 (8.3)	10 (17.6)	<0.001
Several time per week	14 (23.3)	25 (43.1)		12 (20)	35 (61.4)	
1-4 times per month	23 (38.3)	15 (25.9)		25 (41.7)	10 (17.6)	
Once per 2-3 months	15 (25)	7 (12.1)		15 (25)	2 (3.2)	
Never	3 (5)	5 (8.6)		3 (5)	0 (0)	
Control						0.527
Intervention						<0.001
Olive oil						
1 or more per day	9 (15)	7 (11.9)	0.269	2 (3.3)	42 (70)	<0.001
Several time per week	8 (13.3)	12 (20.3)		9 (15)	9 (15)	
1-4 times per month	11 (18.3)	14 (23.7)		11 (18.3)	0 (0)	
Once per 2-3 months	20 (33.3)	16 (27.1)		21 (35)	3 (5)	
Never	12 (20)	10 (16.9)		17 (28.3)	6 (10)	
Control						0.007
Intervention						<0.001
Red meat						
2 or more per day	9 (15)	10 (17)	0.418	9 (15)	0 (0)	<0.001
Once a day	44 (73.3)	39 (66.1)		44 (73.3)	28 (48.3)	
Several time per week	6 (10)	10 (16.9)		6 (10)	28 (48.3)	
1-4 times per month	1 (1.7)	0 (0)		1 (1.7)	2 (3.4)	
Control						0.9
Intervention						<0.001

Table 3: Nutritional patterns of control and intervention groups, before and after intervention						
Food	Before		P	After		P
	Intervention	Control		Intervention	Control	
Cake and cookie						
1 or more per day	25 (41.7)	19 (31.7)	0.136	25 (41.7)	3 (5)	<0.001
Several time per week	28 (46.7)	25 (41.7)		29 (48.3)	7 (11.7)	
1-4 times per month	4 (6.7)	10 (16.7)		3 (5)	21 (35)	
Once per 2-3 months	2 (.3)	4 (6.7)		2 (3.3)	22 (36.7)	
Never	1 (1.7)	2 (3.3)		1 (1.7)	7 (11.7)	
Control						0.9
Intervention						<0.001
Snacks						
1 or more per day	8 (13.4)	2 (3.4)	0.081	7 (11.6)	0 (0)	<0.001
Several time per week	12 (20)	6 (10.3)		12 (20)	3 (5)	
1-4 times per month	14 (23.3)	13 (22.4)		14 (23.3)	8 (13.3)	

Contd...

Food	Before		P	After		P
	Intervention	Control		Intervention	Control	
Once per 2-3 months	12 (20)	22 (37.8)	0.081	12 (20)	35 (58.3)	<0.001
Never	14 (23.3)	15 (25.9)		15 (25)	14 (23.3)	
Control						0.366
Intervention						0.017
Visceral meat						
Several time per week	17 (28.3)	17 (28.3)	<0.001	6 (10.2)	0 (0)	0.129
1-4 times per month	13 (21.7)	13 (21.7)		16 (27.1)	8 (13.6)	
Once per 2-3 months	28 (46.7)	28 (46.7)		33 (55.9)	45 (76.3)	
Never	2 (3.3)	2 (3.3)		4 (6.8)	6 (10.2)	
Control						0.9
Intervention						0.001
Fish and shrimps						
1 or more per day	1 (1.7)	0 (0)	0.43	1 (1.7)	1 (1.7)	0.001
Several time per week	13 (21.7)	10 (16.7)		13 (21.7)	33 (55)	
1-4 times per month	31 (51.7)	27 (45)		31 (51.7)	16 (26.7)	
Once per 2-3 months	14 (23.2)	20 (333)		13 (21.7)	10 (16.7)	
Never	1 (1.7)	3 (5)		2 (3.2)	0 (0)	
Control						0.317
Intervention						<0.001
Low-fat dairy						
2 or more per day	4 (6.7)	8 (13.5)	0.373	7 (11.7)	42 (70)	<0.001
Once a day	24 (40)	16 (27.1)		24 (40)	14 (23.3)	
Several time per week	20 (33.4)	25 (42.4)		19 (31.7)	4 (6.7)	
1-4 times per month	8 (13.3)	4 (6.8)		8 (13.3)	0 (0)	
Once per 2-3 months	4 (6.6)	6 (10.2)		2 (3.3)	0 (0)	
Control						0.096
Intervention						<0.001

Table 4: Comparison of mean scores of Beliefs, Attitude, Subjective Norms, Enabling Factors model components between control and intervention groups

	Intervention	Control	P[a]
Awareness			
Baseline	2.78 (2.3-3.2)[b]	2.97 (2.4-3.5)	<0.001
Change	0.35 (0.2-0.5)	3.61 (3.1-4.1)	
Attitude			
Baseline	15.17 (14.2-16.2)	14.34 (13.6-15)	<0.001
Change	−1 (−2-0.02)	11.46 (10.5-12.5)	
Enabling factors			
Baseline	27.66 (26.4-29)	28.17 (27.3-29)	<0.001
Change	0.97 (−0.2-2.1)	3.88 (2.9-4.8)	
Behavioral intention			
Baseline	11.09 (10.39-11.78)	10.93 (10.36-11.79)	<0.001
Change	0.16 (−0.42-0.74)	1.6 (1.18-2.17)	
Abstract norms			
Baseline	15.15 (14.4-15.9)	10.93 (10.4-11.5)	0.003
Change	0.28 (−0.6-1.2)	5.06 (4.3-5.8)	

[a]All test are conducted at significant level of 5%, [b]CI between mean scores. CI: Confidence interval

The average scores of abstract norms at the preintervention stage between the groups were not significantly different. While, 3 months after postintervention follow-up, abstract norms score of intervention group remained elevated.

This study also examined the social norms within family, colleagues, and friends circles. We conducted the training sessions for employees' families as a network and made question and answer discussion in these groups. Several studies explained that family, friends, and peers have a significant role in determining individuals' nutritional behavior.[9,12,15]

Accordingly, it can be inferred that the educational program has improved the nutritional effectiveness in the intervention group. Several studies conducted on the effectiveness of nutritional education have shown different results, i.e., some of them reported no improved effectiveness.[11]

Considering the nutritional pattern, 3 months after intervention, intervention group consumed less cake and cookie, snacks (as chips), drinks (as soda, soft beer, fruit juices), red and visceral meats, and at the same time they ate more fresh fruits, salad, vegetables, fish, shrimp, law-fat dairies, and olive oil. This improvement of the employees' nutritional behaviors is shown by other studies.[8,11,15,19,22]

out the special role of enabling factors in changing behavioral intention to a desired action[11,15,29] The other finding of this study refers to behavioral intention which was improved significantly in the intervention group possibly due to improvements of other factors of the model. These findings are in the line with that of Hazavehei *et al.*[11,27]

Conclusion

BASNEF educational pattern with suitable and integrated structure led to improved awareness and other components of the model in addition to improved dietary behaviors of the employees to reducing cardiovascular risk factors following a 3 months intervention. Finally, it is recommended to use BASNEF model in educational programs of other factors affecting cardiovascular disease.

Conflicts of interest

There are no conflicts of interest.

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