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Original Article

Assessment of the Effect of Nutrition Education Based on BASNEF Model on Decreasing Blood Lipid Profile

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Abstract

Background and aims: Dyslipidemia is one of the major causes of cardiovascular disease (CVD); however, it can be prevented and controlled via observing and adherence to a diet. This study aimed at determining the effect of nutrition education based on BASNEF model on decreasing blood lipid profile.

Methods: This clinical trial study was conducted on 150 people with a high blood lipid profile who referred to Shahrekord laboratories in 2020. The samples were randomly divided into intervention and control groups. In order to measure blood lipids such as high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglyceride (TG), and total cholesterol (TC), 15 mL of venous blood samples were collected after 12 hours fasting before the intervention and again 2 months after the intervention. The intervention group received nutrition education based on BASNEF model, and the collected data were analyzed using SPSS version 20 software.

Results: There was no significant difference between the two groups in terms of demographic variables. TG levels in the intervention group decreased significantly after the intervention ($P<0.001$). In addition, TC and LDL levels decreased significantly in the intervention group after the intervention ($P<0.001$), while the level of HDL index in the intervention group increased significantly after the intervention. Nonetheless, there was no significant difference in these indices in the control group after the intervention ($P>0.05$).

Conclusion: The significant decrease in blood lipids after a short period indicates the effect of nutrition education based on BASNEF model and adherence to proper diet on controlling blood lipids. Therefore, recommending people to adhere to a proper diet can help raise people's nutritional awareness and reduce blood lipids.

Keywords: Nutrition, Education, BASNEF model, Blood lipid profile

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Introduction

Nowadays, cardiovascular disease (CVD) is considered one of the most important health threats.[1]. In today's world, CVD is the leading cause of disability and morbidity in many countries, including developing countries.[2,3]. According to the World Health Organization's third report, CVD kills 17.9 million people each year.[4] At present, the prevalence of this disease is increasing in Iran, so it has become the first major cause of death in people over 35 years of age, and unfortunately, the age of the incidence of this disease has decreased in recent years.[1]

Various factors affect the development of CVD including the workplace, family history, and the underlying risk factors, all of which must be addressed.[5] The prevalence of dyslipidemia is increasing today that is due to changes in lifestyle, industrialization of societies, changes in the eating habits, and the reduction in physical activities.[6] Dyslipidemia (abnormal level of blood lipid) is a medical condition characterized by an increase in one or all lipid profiles or blood lipoproteins including serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), and a decrease in high-density lipoprotein cholesterol (HDL-C). Dyslipidemia is a major risk factor for coronary heart disease.[7,8] The prevalence of dyslipidemia varies widely depending on the ethnic, social, economic, and cultural characteristics of different population groups.[8]

According to the Tehran Lipid and Glucose Study, which was performed on adults in Tehran, the mean TC level was 210 mg/dL. According to population-based studies in different cities of Iran which were conducted on both sexes in both rural and urban areas, the overall prevalence of high TC (≥ 200 mg/dL) in people aged over 18 years is estimated to be 41.6%. The prevalence of hypertriglyceridemia or high triglyceride (≥ 150% mg/dL) in adults of both sexes and in both urban and rural areas is reported to be 46%. The prevalence of hypertriglyceridemia in Iran is higher than that in many other Western or Eastern countries.[9] The prevalence of high LDL-C levels (≥ 130 mg/dL) has been reported to be 35.5% in adults of both sexes and in both urban and rural areas, and its level has been higher among urban women in many studies. Low levels of HDL-C (< 40 in males and < 50 in females) have been reported to be 43.9% in adults of both sexes and in both urban and rural areas.[9] Therefore, based on the above-mentioned statements, the prevalence of dyslipidemia in Iran seems to be high. As mentioned, CVD has a multifactorial cause. Many factors, known and unknown, contribute to the risk of CVD, so a fully effective preventive strategy must be devised to address multiple elements. Among the environmental factors that influence the occurrence and the degree of risk factors, nutrition and lifestyle are of particular importance. The overall dietary pattern of the Iranian population over the past 30 years indicates a twofold increase in fat consumption. This significant increase in fat intake coupled with lifestyle changes is alarming.[10] It is currently recommended that people with fat disorders be targeted for lifestyle modifications, which mainly include increased physical activity and improved diet.[10] It is generally believed that patients need the education to recognize and understand their health status, make decisions about health care, and change their health behaviors.[11] Today, the overall structure of comprehensive health care should focus on education and self-care rather than treatment or reliance, and it is necessary to enhance people's capacity for recovery and independence.[11] Health education helps people to make decisions about health and gain the confidence and skills needed to make decisions.[12] The value of health education programs depends on the effectiveness of these programs.[13] On the other hand, the effectiveness of health education programs increases when basic health needs are supported with stronger theoretical facts.[14] Studies have shown that the most effective educational programs are based on theory-based approaches that are rooted in behavioral change patterns. In addition, selecting an appropriate health education model or theory is the first step in the process of planning an educational programs. Effective health education depends on mastering the application of the best theories and strategies for any special events.[15]

BASNEF model (beliefs, attitude, subjective norms, and enabling factors) is used to study behavior, make plans to change behavior, and determine the factors that influence people's decision to adopt an effective behavior.[16] BASNEF model is the most comprehensive model used to study behavior, identify behaviors, and create new and emerging behaviors in a community. BASNEF model is made up of various constructs such as beliefs and views toward behavior assessment (Beliefs), attitudes toward behavior (Attitudes), abstract norms (Subjective norms), and empowering factors (Enabling factors).[17-19] Using educational intervention based on the BASNEF model, this study sought to increase and improve the awareness of patients with dyslipidemia, improve their attitude toward controlling blood lipid levels, and motivate them to practice appropriate activities. It also tried to decrease the level of lipids via providing patients with enabling factors such as adequate information and relevant guidelines regarding blood lipid control activities, involving patients' families, and intervening in their abstract norms. The main objective of such interventions is to enable patients with dyslipidemia to employ blood lipid control methods and control their disease to avoid complications of the disease. The aim of this study was to evaluate the effect of nutrition education based on the BASNEF model on decreasing blood lipid profile in patients with hyperlipidemia.

Materials and Methods

Study Design and Population

This clinical trial study was carried out in 2020 to evaluate the effect of education based on the BASNEF model on the reduction of blood lipid profile in patients with hyperlipidemia. The study was conducted on 150 patients with high blood lipid profile who referred to Shahrekord laboratories to undergo biochemical tests. The patients were then randomly assigned to one of the two groups of intervention and control (75 patients in each group). Each patient was given a code, and then a lottery was drawn between the codes. The eligible people were assigned to intervention and control groups one by one; that is, one was assigned to the intervention group and the other to the control group.

The total sample size was calculated to be 152 individuals with 76 persons in each group.[20] After the initiation of the study and considering the inclusion criteria, 150 people were enrolled in the study.

Inclusion Criteria

Only the patients with a high lipid profile and with a tendency to participate in the study, who met the following criteria, were enrolled in the study:

1. Men and women aged 30-60 years old
2. Not taking any drugs that affect blood lipids and antioxidants
3. Not being affected by liver and kidney diseases, diabetes, depression, thyroid disorders, blood disorders, and myocardial infarction
4. Failure to follow a specific diet
5. No history of smoking, alcohol intake, and drug abuse
6. Attending all training classes
7. Willingness to cooperate up to the end of the project

Measuring Tools

The data on demographic features (e.g., age, sex, level of education, and occupation), history of illness, and the use of medications and supplements were collected and recorded by the researchers. To prevent individual errors, all the measurements were performed by one person. After 12 hours of fasting, 15 mL of venous blood samples were collected once before the intervention and once again after the intervention. After centrifugation of the samples for 20 minutes, the obtained serum was divided into several sections and stored at -80°C until analysis was conducted. The biochemical parameters were evaluated in terms of lipid profiles including TC, TG, and HDL-C and measured using a laboratory kit per mg/dL using an auto-analyzer apparatus.

LDL-C was calculated using Friedewald's formula.[21] The amount of very-low-density lipoprotein was calculated by dividing the total TG by 5. In addition, a checklist was used for both the intervention and control groups to record biochemical indices including TG, TC, LDL-C, and HDL-C in two stages: before the intervention and eight weeks after the intervention.

Intervention

After collecting the abovementioned information from both intervention and control groups, nutrition education based on the BASNEF model was carried out for the intervention group by a health education specialist and a nutritionist in three one-hour sessions via lectures, question and answer sessions, brainstorming, and group discussion. Initially, to change the attitudes and generate correct beliefs in the patients, a training session was held to raise their awareness about the important role of nutrition in controlling and decreasing blood lipids.

In sessions, it was tried to use the available statistics and figures to introduce valuable nutrients for lowering blood lipids. To raise the awareness of the members in the intervention group, it was also tried to inform the participants of harmful foods, normal blood lipid levels, methods of the prevention of hyperlipidemia, definitions of HDL and LDL, frequency of blood lipid measurement, and other similar items. In the next step, the family members of the patients who were in charge of purchasing food and cooking for the family were invited to a training session in order to train them about the role of nutrition and nutritional behaviors in controlling and reducing blood lipids. The goal of this session was to highlight the importance of abstract norms in controlling the nutrition of patients with high blood lipid levels. To reinforce the educational issues presented in previous sessions and to answer likely questions, telephone follow-ups were conducted the second week after the training. Finally, to target enabling factors (e.g., skills, healthcare resources, and access), some other pieces of training were presented to help the patients become fully aware of the food groups (e.g., bread and cereals, milk and dairy products, meat and beans, fruits, and vegetables)[22] and the amount of daily intake required for patients with blood lipids. These pieces of training were presented to help the patients to maintain a healthy diet, for instance, to reduce sugars and foods with the high glycemic index, reduce saturated fats, reduce food sources containing trans-fatty acids, consume oils properly, reduce cholesterol intake, increase the consumption of fiber-rich foods, especially fruits and vegetables, reduce the consumption of ready meals, and learn how to cook properly. For example, consumption of at least 400 g or five portions of fruit and vegetables per day decreases the risk of non-communicable disease and help to confirm an adequate daily intake of dietary fiber. Fruit and vegetable intake can be enhanced by:

- Continuously counting vegetables in meals;
- Consumption of fresh fruit and uncooked vegetables as snacks;
- Consumption of fresh fruit and vegetables that are in time and consumption of a diversity of fruit and vegetables.

Further, fruit and vegetable intake can be increased by steaming or boiling instead of frying when cooking, substituting butter with oils rich in polyunsaturated fats such as soybean, corn, canola (rapeseed), and sunflower oils, consuming reduced-fat dairy foods and lean meats, or decorating observable fat from meat, and restricting eating baked, fried, and pre-packaged foods and snacks (e.g., doughnuts, cakes, cookies, and biscuits) that enclose industrially-produced trans-fats.[22]

Data Analysis

Descriptive statistics, the Kolmogorov-Smirnov test, independent *t* test, and one-way ANOVA were used for data analysis which was conducted via SPSS 20 software. The level of significance was set at $P<0.05$ for all tests.

Results

Of all the study participants in the intervention group, 55 persons (41.25%) and 20 persons were females and males, respectively, while in the control group, 50 persons (37.5%) were females and 25 persons (18.75%) were males. Of all, 31 subjects in the intervention group and 22 subjects in the control group were employed. In addition, the level of education in the intervention group was higher than high school diploma in 32.25%, while it was secondary school and diploma in 22.5% of subjects in the control group (Table 1).

Before conducting inferential tests, the Kolmogorov-Smirnov test was performed on the data, and it was found that the data had a normal distribution.

The results showed that there was no significant difference between the intervention and control groups in terms of the mean TG level before the intervention; however, this index decreased in the intervention group after the intervention, while no significant change was observed in the control group. After the intervention, there was a significant decrease in the levels of TC and LDL and a significant increase in the level of HDL index in the intervention group, while none of these indices had a significant change in the control group (Table 2).

Table 1. Frequency Distribution of Demographic Variables in the Intervention and Control Groups

		Intervention Group	Control Group
		No. (%)	No. (%)
Gender	Female	55 (41.25)	50 (37.5)
	Male	20 (15)	25 (18.75)
Job	Employee	31 (23.25)	22 (16.5)
	Self-employed	9 (6.75)	13 (9.75)
	Farmer	10 (7.5)	15 (11.25)
	Housewife	10 (7.5)	5 (3.75)
	Other	15 (11.25)	20 (15)
Education	Illiterate	5 (3.55)	4 (3)
	Primary school	15 (11.25)	20 (15)
	Secondary and high-school diploma	24 (18)	30 (22.5)
	Higher than high-school diploma	31 (32.25)	21 (15.75)

Table 2. Comparison of Mean and Standard Deviation of Biochemical Indices Before and after Training Intervention in the Intervention and Control Groups

Variable	Before the Intervention Mean ± SD	After the Intervention Mean ± SD	*P* Value
TG (mg/dL)			
Intervention group	182.91 ± 21.873	160.30 ± 16.862	0.001
Control group	184.22 ± 20.394	185.30 ± 24.107	0.542
P value	0.052	0.001	
TC (mg/dL)			
Intervention group	247.39 ± 38.056	216.22 ± 41.964	0.001
Control group	240.17 ± 29.713	232.57 ± 29.925	0.011
P value	0.069	0.001	
LDL (mg/dL)			
Intervention group	154.43 ± 20.950	124.65 ± 27.881	0.001
Control group	153.61 ± 23.438	150.35 ± 21.274	0.114
P value	0.051	0.001	
HDL (mg/dL)			
Intervention group	29.61 ± 3.811	35.02 ± 5.160	0.001
Control group	31.09 ± 3.825	30.09 ± 4.823	0.185
P value	0.062	0.001	

Note. SD: Standard deviation; TG: Triglyceride; TC: Total cholesterol; LDL: Low-density lipoprotein; HDL: High-density lipoprotein.

Discussion

The aim of this study was to determine the effect of training based on the BASNEF model on decreasing blood lipid profile in patients with high blood lipids in Shahrekord. The results showed that intervention and control groups did not have significant differences in terms of demographic variables before the intervention.

The findings of the present study indicated that nutrition education based on the BASNEF model could cause a significant decrease in blood TG levels in the intervention group. Consequently, TC and LDL levels significantly decreased in the intervention group after the intervention; however, a study by Najimi et al showed that after 3 months of nutrition education in the elderly with diabetes, there was no significant change in the level of light lipoprotein in the intervention group. [23]

The results of Lim and colleagues' study also demonstrated a 30.8% reduction in TG and a 20.9% reduction in lipoprotein after conducting a training intervention that aimed at modifying the eating habits of patients with blood lipid disorder.[24] The results of a study by Pasdar et al[25] revealed that LDL-C levels significantly decreased in patients who adopted a low-fat, low-cholesterol, and high-fiber diet.

On the other hand, the level of HDL indices in the intervention group significantly increased after the intervention, while none of the indices in the control group had a significant change. Jafari et al examined the impact of nutritional education using blogs, group-collaborative blogs, and SMS on glucose and lipid profiles in patients with type II diabetes and found out that TC and LDL-C levels significantly reduced in the blogs, but the levels of TG and HDL-C were not significantly different. In the group-collaborative blogs, the difference between TC and LDL-C was significant, but the difference between TG and HDL-C was not significant. Furthermore, in the SMS group, the differences were significant in terms of TC, TG, and LDL-C levels, but the difference was not statistically meaningful in HDL-C level.[26] According to a study by Lim et al,[24] nutrition education interventions alone had a small effect on HDL-C levels, but a combination of interventions including nutrition education and physical activity could improve HDL-C levels.

In their study, Rush et al[27] reported that after 5 months of adopting a special diet and practicing physical activity in patients, total body fat and body fat percentage decreased in the studied men. On the other hand, in both males and females, HDL-C levels increased, and the ratio of TC and LDL-C to HDL-C decreased as well. These results are consistent with the findings of the present study.

Various studies have demonstrated that communities that use herbal-based diets are less at risk of ischemic-related mortality.[25] In a study by Mirmiran et al,[28] the consumption of more than four units of fruits and vegetables was also associated with lower LDL-C and TC levels and thus was associated with a lower risk of CVD.

Given that the present study focused on the consumption of a low-fat, low-cholesterol, and high-fiber diet, the results confirm the role of increased intake of high-fiber foods, especially fruits and vegetables, reduced intake of ready-made foods and a variety of oils in reducing LDL-C and TC levels, which in turn are associated with a lower risk of CVD.

In this study, the sample size was small and limited, and some patients had a poor cooperation. Given that lifestyle change and lowering blood lipids in a community play an important role in reducing the economic burden of CVD in our country, it seems necessary to adopt macro-level policies to supply healthy foods and modify dietary patterns to prevent hyperlipidemia and CVD as a national program. On the other hand, it is necessary to provide targeted and planned training using theories and models of health education and health promotion.

Conclusion

The present study showed that recommending the patients to adopt a low-fat, low-cholesterol, and high-fiber diet and providing dietary training based BASNEF model for patients with hyperlipidemia over a two-month period significantly reduced their LDL-C levels and increased their HDL levels, confirming the effective role of BASNEF model, even in the short term, on the reduction of the number of blood lipids.

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Conflict of Interest Disclosures

The authors declare that there is no conflict of interests.

Ethical Approval

At the beginning of the study, the researchers provided the study subjects with some explanations on how the research would be conducted, introduced the final users to the results of the study, and ensured the participants of confidentiality of their information. The researchers noted that there was no need to write a full name on the data collection sheets, and every participant would be given a code that would be used to assign the collected data to each person. It was also stated that the results are reported in general. In addition, a consent form was completed by the participants.

This study is extracted from a research project with a code of 3128 which was approved by Social Determinants of Health Research Center, Shahrekord University of Medical Sciences with the Ethics Registration Code of IR.SKUMS.REC.1395.275.

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