Effect of Cognitive-Behavioral Therapy on Dietary Adherence of Patients with Ischemic Heart Disease: A Randomised Controlled Trial

Elham Karimi

Rafsanjan University of Medical Sciences

Ali Akbari

Rafsanjan University of Medical Sciences

Ahmad Reza Sayadi

Rafsanjan University of Medical Sciences

Hamid Safarpour

Ilam University of Medical Sciences

Ali Khodadadzadeh (✉ a_khodadadi@rums.ac.ir)

Rafsanjan University of Medical Sciences

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Abstract

Background: It is generally accepted that diet is a key factor in increasing the risk of atherosclerosis and ischemic heart disease (IHD). Lifestyle changes can reduce the incidence of atherosclerosis. Psychological interventions are of the effective approaches to control dietary adherence. The aim of this study was to determine the effect of cognitive behavioral therapy (CBT) on the dietary adherence of IHD patients admitted to the critical care unit (CCU) of Ali ibn Abi Talib Hospital in Rafsanjan, Iran, 2018.

Methods: A randomised controlled trial was conducted through face-to-face interview on 50 patients admitted to the CCU. The samples were selected based on inclusion criteria and minimization method. The CBT was performed on the case group for three months. The researcher completed the food frequency questionnaire (FFQ) in three periods of baseline, one month and three months after the last session of intervention. Finally, the data were analyzed by SPSS version 18 software using independent t-test, paired t-test, Chi-square and Fisher tests.

Results: Overall, 50 IHD patients (25 controls, 25 cases) were enrolled in our study, consisting of 17 females (10 cases, 7 controls) and 33 males (15 cases, 18 controls). The mean age of patients participating in this study was 61 years. The mean score of dietary adherence in case and control groups at the baseline did not differ significantly ($P > 0.05$), but showed a significant increase after one and three months of intervention for the case group ($p < 0.05$).

Conclusion: The results of this study showed that CBT intervention could improve dietary adherence in the IHD patients. Therefore, nurses and community health professionals can use the influence of this type of intervention on the diet modification of patients in their healthcare programs.

Trial registration: This study was registered on Iranian Registry of Clinical Trials with the registration code of IRCT20171002036498N2.

Background

Ischemic heart diseases (IHDs) are conditions caused by limitation of blood flow to myocardium and its ischemia. These diseases often occur due to coronary artery occlusion, such as atherosclerosis. Types of IHD include angina, Prinzmetal's angina, and myocardial infarction [1]. The IHD is the leading cause of death in today's world. Cardiovascular diseases (CVDs) account for 10% of all deaths in the world in the early twentieth century, but they are responsible for 50% of deaths in developed countries and 25% of deaths in developing countries at the beginning of the twenty-first century. It is estimated that more than 32 million deaths from CVD occur in the world by 2030 [2, 3]. The incidence rate of IHD in Asia, with the exception of Japan and Singapore, is far more than in the United States [4, 5]. Official statistics from the Ministry of Health and Medical Education in Iran also show that 33 to 39.3% of deaths in the country are due to CVD, with having the highest cardiac death rate record in the world. According to the report, 300 people die in the country daily due to cardiac complications, while the lifestyle and type of nutrition have maximized the CVD risk [6].

Most CVDs can be prevented by modifying behavioral risk factors such as smoking, unhealthy diet, weight gain, obesity, and physical activity. Studies have shown that the IHD has a direct relationship with increased levels of cholesterol, increasing IHD by 2% per 1% increase in cholesterol levels, thereby

increasing the risk of atherosclerosis [7]. Reduce smoking and alcohol, weight loss, and dietary modifications have effective and beneficial roles in controlling lipids. Many studies have indicated that the CVD patients are unaware of the risk factors of their disease and their own regimen, and are discharged without training on risk factors and diet in most cases [8].

The nutritional factors affecting IHD are in two categories, including risk factors such as saturated fat, hydrogenated oils, high salt intake, alcohol consumption and obesity, as well as protective factors such as fish, fruit and vegetable, vegetable oil, dietary fiber and whole grains [7, 9]. Select and maintain healthy nutritional behaviors are among the most important factors in the prevention of IHD. These patients, in addition to adherence to the medication diet, should also get the necessary information on the diet, physical activity, and the control of signs and symptoms. A healthy diet helps to minimize the progression of heart disease. The active participation of patients themselves is important in controlling and treating high-risk behaviors. This engagement requires the patients to believe that they have the ability to control and change behavior. Learning this behavior needs the collaboration of the patient and the team [10]. In order to achieve the ideal therapeutic goal, we need to change our long-term behavior. Long-term behavioral change for adherence requires special attention not only to educational programs, but also to psychological factors, including the development of healthy behaviors and the reduction of unhealthy behaviors and emotional pressures [11].

Psychological technique is a systematic approach to change the behavior of the individual and includes the following steps:

- Self-control: Observing and recording the individual's daily behaviors, which increases one's awareness of his or her behavior
- Identifying environmental factors and controlling individual stimuli that comply with diet therapy
- Reforming the person's understanding of his or her thoughts about diet therapy
- Controlling stress through relaxation techniques
- Knowing social support as a successful component

Different factors such as strong research support, structured approach, good teaching ability of cognitive-behavioral techniques, coherent and multi-dimensional function of its training programs to emotional, behavioral and social cognitive components are privileges making this approach to be the main selection of researchers in the sciences of prevention and promotion of mental health [11, 12]. Considering that no cognitive-behavioral interventions have been evaluated on the diet of Iranian CVD patients, the purpose of this study was to determine the effect of CBT on the dietary adherence of IHD patients admitted to the CCU of Ali ibn Abi Talib Hospital in Rafsanjan in 2018.

Methods

Study design

This double-blinded randomised controlled trial was performed on the IHD patients admitted to the CCU of Ali ibn Abi Talib Hospital in Rafsanjan in 2018. Data were collected through face-to-face interviews and in direct observation.

Data collection

Data collection tool was the food frequency questionnaire (FFQ) which, based on previous studies, had a validity of 90% for vegetables group and 60-70% for meats and solid oils, and its reliability was 90% for healthy food pattern [13]. The first part of this questionnaire consisted of demographic information (age, gender, educational level, income level, insurance status, occupation, living status, patient caregiver and disease information: duration of illness, underlying disease causing illness, frequency of hospitalization). The second section of the questionnaire included six groups of bread and cereals, vegetables, fruits, milk and dairy products, meat, eggs, beans and miscellaneous group.

Sampling method

The samples were selected based on inclusion criteria, convenience, and randomization and minimization techniques. In this method, the first samples were randomly assigned to one of the groups. For later samples, the sum of samples was taken into account in each of the groups and the sample was assigned to a group that had a smaller sum. The inclusion criteria were the admission to the CCU due to CVD, IHD diagnosis by the physician, the scores less than 50% of the total FFQ score, no participation of patients in other research projects along with this study, no history of psychopathy and satisfaction to participate in the study. Exclusion criteria were the patients' request to leave the study, unwillingness to continue the study, their ill-being and their entry into the acute stages of the disease, inaccessibility to patients for one- and three-month follow-ups, and the lack of participation in even an educational session.

Study methods

This research was approved by the Ethics Committee. First, oral consent was obtained for all participants. The researcher introduced herself and the study purpose, then explained ethical considerations such as secrecy of data and permission to leave the study at any time they want. After selecting the subjects, they were assigned to one of two case and control groups, based on their age and FFQ score. In the case group, based on CBT after the examination of patients, the cause of non-adherence to dietary was determined using a face-to-face interview. The self-confidence of the patient was promoted by emphasizing positive sentences and increasing motivation to change behavior. In order to change the patient's inappropriate behavior, their behavior was corrected by creating interest and talking about problems and barriers related to non-adherence to diet. The education was based on this model with face-to-face training.

The stages of the training sessions are as follows:

Session one: Identify the patient's problem: - What are the barriers that you do not follow your diet? - What factors make your diet more important? - What is the wrong diet?

Session Two: Creating Commitment and Confidence: -Discuss the problems and obstacles related to non-compliance; -Enhance motivation, supporting the patient by expressing positive emphasis. - create an interest in change and positive thinking.

Third session: Using knowledge for change using ABC treatment methods: -Activators (positions). - Beliefs (knowledge of irrational thoughts, commentary regarding the position). -Outcomes (emotions, feelings and excitement)

Session Four: Review Patient Reports: -Checking diet and diet restrictions, -Review patient self-report, - Create satisfactory responses with an emphasis on mental and physical relaxation, and -planning to follow the diet.

At the end of the training sessions, the patients were given the opportunity to ask all their questions and received a summary of the educational package as an educational pamphlet that included training harmful and useful fats and kinds of high-fat foods, the amount of daily salt intake, the amount of dairy consumption per day, the use of fruits and vegetables, the restriction of frying and the use of white meat. The date and place of completion of the questionnaire in the next three months were also determined. The researcher referred to the patients one month and three months after the last session, and the FFQ was completed again. The patients were compared pre and post intervention for dietary adherence. In the case of a patient's discharge, before the end of the training sessions, the place of the remaining sessions was decided upon by the consent of the patients at his place or the heart clinic and the sessions continued.

Statistical analysis

Finally, the data were analyzed by SPSS version 18 software using independent t-test, paired t-test, Chi-square and Fisher tests at the significance level of 0.05.

Results

According to the findings of this study, 50 patients were enrolled in the control and case groups, including 17 females (34%) and 33 males (66%) were present. The mean age of the patients was 60 ± 14 years in the case group and 63 ± 12 years in the control group, but the difference was not significant. Other demographic variables of the population studied are shown in Table 1. The two groups did not differ significantly in terms of demographic variables (Tables 1 and 2).

The results of this study found no significant difference between two case and control groups in terms of dietary adherence level before the intervention (p value = 0.06). The patients were evaluated two times, one month and three months after the intervention. The dietary adherence score of the patients in the control and case groups was 2698 and 2809 at the end of the first month, as well as 2346 and 3504 at

the end of the third month, respectively, which was significantly higher than the baseline in the case group (p value < 0.05, Table 3).

In this study, the interaction of two groups in terms of time, mean of variation $\pm$ standard error of in the intervention group, before, one and three months after intervention was statically significant ($p < 0.00001$). The interaction of two groups in terms of time, mean of variation $\pm$ standard error of in the control group, before, one and three months after intervention was not statically significant ($p > 0.05$) (Table 4).

Discussion

To the best of our knowledge, this is the first clinical trial to evaluate the effectiveness of CBT on dietary adherence in patients with IHD. This study was performed on 50 IHD patients, including 17 females (34%) and 33 males (66%). The high frequency of male sex is consistent with the report published by American Heart Association [14]. In addition, most studies have also described male sex as a risk factor for the onset of the disease [15]. For example, in a study conducted by Youn et al. [16], the male/female ratio of CVD incidence was reported to be 5 to 3. Although recent studies suggest a decrease in the incidence of this disease in men and an increase in women [15], the male gender is still considered as a major risk factor for the onset of this disease. In the present study, the mean age of the patients participating in the study was 61 years, and the high age of these patients was similar to other studies [15, 17]. The CBT is a combination of cognitive and behavioral approaches in which the patient must be able to identify and modify distorted thinking patterns and ineffective behaviors. Since this approach can be influenced by several factors such as educational level, occupation [11], the random sampling was done by minimization method in order to homogenize the two groups in terms of demographic variables (Tables 1 and 2).

Dobson et al. pointed out that cognitive-behavioral outcomes are useful for patients with concurrent disorders, since knowing the factors affecting the disease and reducing its severity and symptoms can help to improve the patient's disorder [11]. In addition, this view can be helpful for people who have no beliefs about their dietary regimen [11, 18]. The first step of cognitive-behavioral intervention is related to detect the causes of non-adherence, and the patient's barriers and difficulties in dietary adherence are examined through face-to-face interviews. These actions can be effective in identifying and removing barriers to non-adherence [11]. The results of a review study by Matteson, which aimed to investigate interventions to improve dietary adherence in patients with chronic disorders, showed that the CBT was more effective than other interventions to adhere the regimen [19].

The results of this study revealed that the CBT could affect the dietary adherence of IHD patients. In this study, the two groups were homogeneous at the baseline in terms of dietary adherence ($P > 0.05$). The CBT was performed on the case group for three months. In evaluating patients after 1 and 3 months, it was found that the CBT could be effective in improving dietary compliance in the IHD patients (Table 3).

In addition, in our study, the effect of time (changes in diet score during continuous measurements), the effect of the group (changes in diet score between the groups studied), and the interaction between time

and group (changes in diet score over time and with taking into account the effect of the groups) showed that there was a significant difference in the intervention group at three different times ($P < 0.00001$), but there was no significant difference in the control group, which confirms the positive effect of cognitive-behavioral intervention in Improve dietary compliance in the intervention group (Table 4)(figure 1).

Increasing the dietary adherence score in the present study can be due to the multifaceted nature of the CBT, because cognitive-behavioral therapies help the patient to become familiar with and correct their own problems, and thus these changes improve emotions and behavior of the individual [11]. The results of our study indicated the importance and influence of self-care programs in patients, which is well documented in other studies. For example, Ezzati et al. examined the dietary adherence in CVD patients and found that most CVD patients, in terms of dietary adherence, were in moderate level (60%) and a small percentage of patients had proper performance [20]. This finding demonstrates the central role of the treatment team in meeting the nutritional training needs of CVD patients and the need for self-care strategies to control diet [11].

In this study, the patients were treated with CBT for three months. The difference between the first month and the third month was significant, so that the dietary adherence score in the case group was 2809 at the end of the first month and 3504 at the end of the third month. Although this difference was significant at the end of the first month and also the third month, the long-term follow-up of this treatment seems to bring better clinical outcomes. Gary et al. examined the combined effect of CBT and exercise on patients suffering from heart failure with duration of three months. Clinical outcomes were also remarkable [21]. Some studies have also considered a shorter time to examine the impact of CBT. For example, in a study by Margo Liber et al., the patients were treated with CBT for 10 weeks and one session per week, and evaluated at the end [22]. Vázquez-Rivera et al. also showed that treatment with CBT had a positive effect on patients even in the short term (5-6 weeks). This finding is in line with our results, as the dietary adherence score was significantly increased in the case group after one month from the start of the study [23].

Our research results confirm this, so that it is necessary to establish initially an effective treatment relationship with the patients in order to improve dietary adherence, identify the causes and barriers of their non-adherence and increase their motivation to change the behavior. The results of the Baumann's study entitled "Helping patients with chronic conditions overcome barriers to self-care" showed that the first step in helping patients to self-care (including dietary adherence) is to identify their problem and to examine the reasons for non-adherence [24]. Some strategies to overcome self-care barriers include motivational interviewing, recognizing individual beliefs, increasing self-efficacy and increasing social support [11]. In the present study, after evaluating patients and identifying the causes of dietary non-adherence, the self-confidence of patients was improved using emphatically positive statements, their motivation was enhanced to modify the behavior, and their wrong behavior in this field was corrected by creating interest and speaking problems and barriers related to dietary non-adherence.

It seems that in order to increase the patient's confidence in pursuing a healthy diet and to improve nutritional modifications in the long term, there is a need for their understanding of the specific dimensions of the disease. Therefore, the patients who believe that the dietary adherence reduces the risk of heart attack and pain, improves their cardiac conditions and prevents readmission, have a higher level of confidence in managing changes in the nutritional regimen after the onset of a cardiac event.

As we observed, the prevalence of low- educational level individuals in the control group was greater than in the case group. Recent studies have shown that if the CVD patients believe that their cardiovascular conditions might be due to poor lifestyle habits, whose modification provides the possibility of cardiovascular improvement or delay and a decrease in the frequency of hospitalization, they would be more likely to strive to make a lasting modification in their nutritional behavior [24-26]. Although this difference was not significant, it could indicate a greater understanding of the intervention group regarding their dietary adherence. In this regard, Khera et al. underlined that a modification in life style could well suppress the individual's genetic predisposition to disease[27]. Therefore, understanding the disease is a predictor of self-efficacy in dietary adherence in CVD patients to achieve desired lifestyle [27, 28]. Therefore, in order to maintain proper dietary adherence, the patient needs to have a good understanding of the disease and believes that a proper nutritional diet can prevent the progression of the disease. This suggests that understanding the disease, as a predictor of nutritional behavior self-efficacy should be emphasized in the conclusion. Considering the results of the study showed that understanding of the disease affects the nutritional behavior self-efficacy, realizing the concept of illness by patients helps health providers to organize their activities to improve their health and promote self-efficacy in CVD patients [29, 30]. Also, the results of this study, which indicate the specificity of understanding the disease in predicting the nutritional behavior of self-efficacy in CVD patients, can attract the attention of clinical nurses who play a major role in the care of CVD patients towards this point that an understanding of the disease in these patients and attempting to promote it can lead to more favorable outcomes in care.

It is important to understand the perception and knowledge of patients about the CVD conditions and to select appropriate and effective methods to improve their perception of their illness. In the field of nursing clinical education, a clinical education program can be presented so that they can plan and strive to improve the self-efficacy of cardiac patients by providing the necessary training. The nurses through implementing the CBT on cardiac patients can elevate their self-efficacy [11]. It should be noted that improving self-efficacy of cardiac patients increases their self-care ability and will prevent repeat referrals, readmission, and occupancy of beds in health centers, thereby decreasing the load of nursing activities and the frequency of repeated training courses for the dietary adherence. Given the priority of prevention over treatment, if the planning of educational managers is adjusted in such a way as to improve the self-efficacy of patients in long-term and after discharge, the final and positive feedback will be returned to the community and the nurses themselves.

Limitations

Given that the results of this study are self-reported through a questionnaire and considering the probability of individual mental conditions at the time of completing the questionnaire, it is recommended to use laboratory results to investigate the outcomes of the intervention.

Conclusion

The results of this study showed that the CBT intervention could improve dietary adherence in the IHD patients. Therefore, nurses and community health professionals can use the effects of this type of intervention on the dietary modalities of these patients and others with chronic diseases admitted to the intensive care units, healthcare centers and clinics.

Abbreviations

CBT: Cognitive Behavioral Therapy

IHD: Ischemic Heart Disease

CCU: Critical Care Unit

CVD: Cardiovascular Diseases

FFQ: Food Frequency Questionnaire

Declarations

Ethics approval and consent to participate

This research was reviewed and approved by the Ethics Committee of Rafsanjan University of Medical Sciences with approval number of IR.RUMS.REC.1397.024 and with the registration code of IRCT20171002036498N2 on Iranian Registry of Clinical Trials

Consent for publication

N/A.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Concept and designed the study: EK, HS, AA, and, ARS. Collection of data: EK, and HS. Analysis and interpretation of data: AA, ARS, and AK. Wrote the manuscript: EK, AK, and HS. Revision of the paper: HS, and AK. All authors reviewed and approved the paper.

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References

1. Kireyev D, Hung J. Ischemic Heart Disease. Cardiac Imaging in Clinical Practice: Springer; 2016. p. 145-9.
2. Willett WC. Dietary fats and coronary heart disease. J Intern Med. 2012;272(1):13-24.
3. Jokinen E. Obesity and cardiovascular disease. Minerva Pediatr. 2015;67(1):25-32.
4. Ueshima H, AS, KM, T. C. , Turin N, Takashima Y, . Kita M, et al. Cardiovascular disease and risk factors in Asia: a selected review. Circulation. (2008);118(25):2702-9.
5. Kyu HH, Bachman VF, Alexander LT, Mumford JE, Afshin A, Estep K, et al. Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013. bmj. 2016;354:i3857.
6. Khajehkazemi R, Sadeghirad B, Karamouzian M, Fallah M-S, Mehrolhassani M-H, Dehnavieh R, et al. The Projection of Burden of Disease in Islamic Republic of Iran to 2025. PLOS ONE. 2013;8(10):e76881.
7. Ramezani Y, Mobasheri M, Moosavi SG, Bahrami A, Rayegan F, Parastui K, et al. Exposure rate of cardiovascular risk factors among clients of health-care clinics in Kashan, Autumn 2010. Journal of Shahrekord Uuniversity of Medical Sciences. 2011;13.
8. Sheikh U, Swabrick D, Ripley D, Gosling O, Kotecha A, Ludman A, et al. ISCHEMIC HEART DISEASE. European Heart Journal-Cardiovascular Imaging. 2017;18(suppl_2):ii7-ii11.
9. Afshin A, Micha R, Khatibzadeh S, Mozaffarian D. Consumption of nuts and legumes and risk of incident ischemic heart disease, stroke, and diabetes: a systematic review and meta-analysis-. The American journal of clinical nutrition. 2014;100(1):278-88.
10. Nordestgaard BG, Varbo A. Triglycerides and cardiovascular disease. The Lancet. 2014;384(9943):626-35.
11. Dobson D, Dobson KS. Evidence-based practice of cognitive-behavioral therapy: Guilford Publications; 2018.

12. Leon AS, Franklin BA, Costa F, Balady GJ, Berra KA, Stewart KJ, et al. Cardiac rehabilitation and secondary prevention of coronary heart disease: an American Heart Association scientific statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity), in collaboration with the American association of Cardiovascular and Pulmonary Rehabilitation. *Circulation*. 2005;111(3):369-76.
13. Ebrahimi, Mameghani M, Behroozi-Fared-, Mogaddam A, Asghari-, M. J. Assessing the reliability and reproducibility of food frequency questionnaire and identify major dietary patterns in overweight and obese adults in Tabriz, Iran. *J Mazand Univ Med Sci*. 2014;; 23(Suppl 2):46-57 (Persian).
14. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Heart disease and stroke statistics—2016 update: a report from the American Heart Association. *Circulation*. 2015:CIR. 0000000000000350.
15. Al Ahmari AS, Alsbhani WM, Al Hamad MA, Al Hamad SA, Sakabomi DM, Aljehani SM, et al. Prevalence of Risk Factors for Coronary Heart Disease among Patients Presented in Cardiology Clinic at King Abdul-Aziz Hospital and Oncology Center-Jeddah. *Egyptian Journal of Hospital Medicine*. 2017;68(2).
16. Yoon SSS, Dillon CF, Illoh K, Carroll M. Trends in the prevalence of coronary heart disease in the US: National Health and Nutrition Examination Survey, 2001–2012. *American journal of preventive medicine*. 2016;51(4):437-45.
17. Freedland KE, Carney RM, Rich MW, Steinmeyer BC, Rubin EH. Cognitive behavior therapy for depression and self-care in heart failure patients: a randomized clinical trial. *JAMA internal medicine*. 2015;175(11):1773-82.
18. Sharp J, Wild MR, Gumley AI. A systematic review of psychological interventions for the treatment of nonadherence to fluid-intake restrictions in people receiving hemodialysis. *American Journal of Kidney Diseases*. 2005;45(1):15-27.
19. Matteson ML, Russell C. Interventions to improve hemodialysis adherence: A systematic review of randomized-controlled trials. *Hemodialysis international*. 2010;14(4):370-82.
20. Nayleh Ezzati ZAS, Hojjat Zerati Dietary Diet Monitoring in Patients with Coronary Artery Disease in Selected Tabriz Hospitals in Tabriz. 1385.
21. Gary RA, Dunbar SB, Higgins MK, Musselman DL, Smith AL. Combined exercise and cognitive behavioral therapy improves outcomes in patients with heart failure. *Journal of psychosomatic research*. 2010;69(2):119-31.
22. Liber JM, van Widenfelt BM, van der Leeden AJ, Goedhart AW, Utens EM, Treffers PD. The relation of severity and comorbidity to treatment outcome with cognitive behavioral therapy for childhood anxiety disorders. *Journal of Abnormal Child Psychology*. 2010;38(5):683-94.
23. Vázquez-Rivera S, González-Blanch C, Rodríguez-Moya L, Morón D, González-Vives S, Carrasco JL. Brief cognitive-behavioral therapy with fibromyalgia patients in routine care. *Comprehensive psychiatry*. 2009;50(6):517-25.

24. Baumann LC, Dang TTN. Helping patients with chronic conditions overcome barriers to self-care. *The Nurse Practitioner*. 2012;37(3):32-8.
25. Tusso P, Stoll SR, Li WW. A plant-based diet, atherogenesis, and coronary artery disease prevention. *The Permanente Journal*. 2015;19(1):62.
26. Mack M, Gopal A. Epidemiology, traditional and novel risk factors in coronary artery disease. *Heart failure clinics*. 2016;12(1):1-10.
27. Khera AV, Emdin CA, Drake I, Natarajan P, Bick AG, Cook NR, et al. Genetic risk, adherence to a healthy lifestyle, and coronary disease. *New England Journal of Medicine*. 2016;375(24):2349-58.
28. Lau-Walker M. Predicting self-efficacy using illness perception components: A patient survey. *British journal of health psychology*. 2006;11(4):643-61.
29. Hirani SP, Newman SP. Patients' beliefs about their cardiovascular disease. *Heart*. 2005;91(9):1235-9.
30. Meichenbaum D. Changing conceptions of cognitive behavior modification: Retrospect and prospect. *The Evolution of Cognitive Behavior Therapy*, Routledge. 2017:32-8.

Figures

Figure 1

The mean of food score in the case and control groups in terms of time

Supplementary Files

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